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A Designed Research Study Examining The Impact Of Using A Motivational Model For Mastering The Crash Cart

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A DESIGN-BASED RESEARCH STUDY EXAMINING THE IMPACT OF USING A MOTIVATIONAL MODEL FOR MASTERING THE CRASH CART

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Introduction

Hospital nurses encounter many in-hospital cardiac arrests (IHCA) that require them to respond immediately and to provide efficient competent care. Approximately 200,000 IHCA's occur within the United States yearly with only half of the patients surviving (Robert Wood Johnson Foundation, 2012). IHCA is often referred to as a *code blue* in hospital settings and will be used interchangeably in this dissertation (Sandroni, et al., 2007).

The Joint Commission 2013 (JC) is a regulatory agency that seeks to improve the quality of healthcare to the public through hospital accreditation. Hospitals must meet established criteria, maintain clinical standards and provide quality healthcare to the public. They are expected to provide education and consultation for healthcare providers. Hospitals are required to follow the JC standards related to resuscitation efforts. Some of the requirements are: strategically placing emergency medical equipment throughout the hospital for quick access and evidence-based training for nurses involved in a code blue. The medical staff must be able to use the designated equipment, demonstrate competency in resuscitation and medication management as well as documenting the resuscitation.

The American Heart Association, Get-With-The-Guidelines® has set up a registry to monitor cardiac arrests. IHCA is defined by: unresponsiveness and absent pulse with apnea or agonal respirations. The incidence of IHCA ranges between 1 and 5 per 1000 admissions thus resulting in < 20% survival rate to discharge (Sandroni, Nolan, Cavallaro, & Antonelli, 2007). The abrupt loss of heart function is responsible for more than 60% of adult deaths (Goldberger, Chan, Berg, Kronick, Cooke, Lu, Banerjee, Hayward, Krumholz, Nallamothu, 2012).

It is expected that patients' code status should be determined, usually at the time of admission into a hospital. This requires the physician to obtain consent and direction from the patient or an appointed person. If the patient is incapacitated the appointed person determines whether or not there will be resuscitation in the event that one was necessary. In an emergency, if there were no advance directives by the patient regarding medical interventions, then emergent care would be provided per standards of care. However, if someone chooses not to have emergency interventions in terms of a code blue, it is then communicated and documented by healthcare personnel, as *DO NOT RESUSCTIATE* (DNR) patient. This is documented as a DNR in the patient's medical record and often referred to as the code status. The patient, or the patient's delegate, can change or update this status at any time and it is usually only valid during the current admission. It is the responsibility of the physician and the nurse to know the code status of their patients if available.

Initiating cardio-pulmonary resuscitation (CPR) is one of the first steps in a code blue, and it is followed by lifesaving interventions utilizing the crash cart. Nurses are expected to be familiar with the crash cart. In some institutions there may be several different types of crash carts that vary in color, labeling and even the equipment. However, many are not familiar with specific items located within the crash cart, which often leads to unnecessary delays. One of the challenges nurses experience in during a code blue, is being ill-prepared to fully participate. The crash cart looks like a mechanic's tool cart with several labeled drawers (Appendix A). Crash carts are not always standardized; however each cart contains similar items that are stocked by hospital personnel.

The cart contains emergency medications, instruments, intravenous fluids, and a defibrillator that sits on top of the cart with a backboard attached onto the side of the cart. The crash cart remains locked to prevent personnel from removing supplies from the cart. Carts are

strategically placed in accessible areas for nurses to retrieve in the event of a code blue. In some instances there are different types of crash carts that are designed specifically for pediatric patients. Nurses do not utilize crash carts on a regular basis; therefore unfamiliarity with cart contents can cause delays and confusion.

The American Heart Association (2012) expects that healthcare providers obtain and renew their Basic Life Support Training (BLS) every two years. This training includes recognizing an unresponsive person, activating an emergency-response system, initiating CPR, and utilizing an automated external defibrillator. Registered Nurses (RN) are expected to be familiar with code blue procedures as well as to participate fully.

It is the expectation in most acute-care settings that a RN be prepared and actively involved in a code blue medical event, regardless of whether or not they are a novice or an expert practitioner. In either case, nurses are required to be familiar with and responsible for the crash cart, prepare and or administer emergency medications, utilize the emergency equipment and document the code blue events. Emergency room nurses or critical care nurses are more likely to be more proficient and confident in participating in code blues, due to the frequency of exposures. Conversely, nurses working in other specialties, such as medical/surgical, rehabilitation or psychiatry where cardiac events are less likely to occur, often lack the confidence and skills necessary to perform proficiently in a code blue medical event.

Becoming familiar with the contents of the crash cart and the equipment is one of the biggest challenges nurses face. There are several reasons why nurses are not familiar with the crash cart contents and experience increased anxiety. The crash cart remains locked typically until a code blue is initiated. This lack of access and exposure leads to the inability to be proficient and confident in performing essential tasks during a code blue. Typically, the practice in most institutions is to have the crash cart checked daily by a nurse for the outside contents

only. Nonetheless, some institutions do not allow nurses to access the inside contents of the cart, other than during an emergency situation.

Even if the nurse accesses the inside of a crash cart outside of an emergency situation, they may still not be familiar with the equipment and contents due to a lack of training and exposure. Most hospital orientations for new employees include a review of the crash cart or a mock code blue, but training varies greatly among health care institutions. A mock code is a simulated version of a code blue. Some institutions do mock codes randomly, quarterly, semi-annually or yearly. This strategy is typically used with a group of nurses during their regularly scheduled work hours.

Unsurprisingly, nurses report much fear and anxiety regarding what is in crash cart, not knowing where to find an item in a crash cart, or how to setup specific equipment. Most nurses struggle with recognition of items found in the crash cart, how to use items, or how to prepare emergency medications. As a result, nurses become very anxious and fearful that the rest of the code team may perceive them as incompetent or view them as ignorant. The purpose of this design-based research is to create motivationally designed instruction for novice nurses who may participate in a code blue.

STATEMENT OF THE PROBLEM

Nurses experience a great deal of anxiety and lack confidence when faced with a code blue situation, and many studies indicate that nurses report their greatest concerns and fears stem from a lack of familiarity with the crash cart, uncertainty of their roles during a code blue, and inexperience in code blue situations (Huseman, 2012). In particular novice nurses experience anxiety and excessive fatigue because they lack the sense of salience with a range of clinical experiences, and the pressure of learning to perform new skills is ever so present (Benner 2004). Adverse effects of anxiety are conceived as a motivational inhibitor producing deficits in study

skills or producing negative effects that disrupt the motivational process (Weiner, 1992). Likewise, it has been reported that resuscitative skills deteriorate because of infrequent code blue exposures. Despite many approaches to training, nurses still remain uncomfortable, lack confidence and feel ill-prepared when real code blue situations arise (Keys, Malone, P., Brim, Schoonover, Nordstrom, & Selzler, 2009). This study sought to discover a meaningful intervention for designing motivational training that will enable RNs to remain competent and confident while using the crash cart in code-blue situations.

PURPOSE AND RESEARCH QUESTIONS

The purpose of this research study was to examine the impact of using a motivational design in developing crash cart training for nurses. The set of research questions that guided this study are:

Q 1. What is the current level of motivation and confidence for novice nurses using the crash cart?

Q 2. Is a mock code blue more effective than a motivational design approach to learning the crash cart?

Q 3. Does crash cart familiarity increase as a result of motivational training?

Q 4. To what extent does the ARCS motivation design impact nurse confidence regarding the crash cart?

Q 5. Does the iterative process of this designed-based research improve the outcomes for learning the crash cart?

The purpose for this mixed-methods, design-based research study was to: (a) determine motivational levels of novice nurses; (b) determine if there is a difference in satisfaction and confidence between traditional crash cart training and ARCS motivational based training; (c)

determine if using ARCS based strategies improve familiarity with crash cart; (d) determine if there is improved response in identifying crash cart items after the training.

Keller's ARCS motivational model was used to guide the instructional design for crash cart training. The design used the strategies that Keller suggests for getting the attention of the nurse, showing the relevance of the training, and increasing their confidence and satisfaction in mastering the crash cart. I the researcher, and the designer of this training, used the motivational model to enhance the nature of the iterative research-based design of the study. Keller's model provided a systematic step-by-step process to identify student motivation and strategies to support instructional design. The model has strategies divided into sets of categories and subcategories based on synthesis of concepts and theories in human motivation (Keller, 2010). For this study, individual strategies from the ARCS model involved embedding them into designing crash cart training. Prior to the research, I conducted a learner analysis to determine levels of motivation for each of the ARCS levels. An analysis guided and informed the designer in which motivational strategies to use and what to emphasize during the initial and subsequent training.

THEORECTICAL CONSTRUCTS

The psychological foundation for this study included behaviorism and constructivist theories. Most learning theorist argue their positions on capacity (how much), practice (how often), motivation, understanding, application (transfer) and retention (forgetting). Behaviorists are concerned with the performance of new behaviors not with immediate learning or understanding (Richey, Klein, and Tracey 2011). For instance, B.F. Skinner (1954) had a major influence on instructional design from the behavioral prospective when he published the article, "The Science of Learning and the Art of Teaching", in which he related his learning theory to deficiencies in schools. He believed that learning could be enhanced by appropriate

reinforcements, with the idea of reinforcing a desired behavior after it occurs, thus encouraging the leaner to repeat the behavior (Skinner, 1954). Skinner, a true behaviorist, discovered that systematically conditioning an individual's response by administering a reward would produce a desired response and punishment would suppress a response which is widely known as stimulus-response theory (Skinner, 1966).

The role of reinforcement through scheduling and shaping were central to Skinner's theory. Skinner discovered that when individuals were rewarded (reinforcement) for desired behavior it would increase the chances the behavior would be repeated. To weaken or eliminate a response (extinction) Skinner withheld rewards or punishment in order to suppress a response (Skinner, 1966). He was most interested in using reinforcements to condition behavior.

Skinner developed the concept of *operant conditioning* where a reward is carefully used to increase the probability that the behavior would occur again. Responses that were triggered by known stimulus were distinguished from behaviors known as operant behavior that occurred without any apparent stimulus (Richey, Klein, and Tracey, 2011). Skinner suggested that motivation is a function of rewards, not punishment and that providing a stimulus or reward to students would lead to more success in the classroom. Carl Binder discusses Skinner's contributions in educational technology, "B.F. Skinner (1976) considered his most important contributions to be use of response rate as the basic measure of behavior and the cumulative response recorder" (p.8) where experimenters directly measured response rates (Binder, 1993). Binder discusses the behavioral fluency paradigm where the individual must achieve accuracy, speed and practice as a dimension of behavior. Recognizing fluency as a desired outcome of instruction reinforced the importance of practice as part of the learning process (Binder, 1993).

Constructivists view learning on what the individual already knows and understands. The learner interacts with the environment and objects, therefore, constructing their own

understandings and solutions to problems. Some constructivists suggest learning requires the learners actively participate in applying themselves to meaningful problems or situations that allow for mistakes and repetition (Kapp & Fergason, 2002). "The constructivist will argue that the student situates the learning experience within his or her own experience and that the goal of instruction is not to teach information, but to create situations so that students can interpret information for their own understanding" (Heinich, Molenda, Russell & Smaldino, 1999, p. 17). Some key contributors to constructivist theory are: Piaget (1954), Dewey (1960), Bruner (1966), Vygotsky's (1896-1934), and Jonassen (1999).

Bruner's constructivist theory provides a general framework for an instructional approach where learning is an active process in which learners construct new ideas or concepts based on their current or past experiences. Bruner's (1966) theory is based on the study of cognition and he outlined a theoretical design of instruction that should address four components: (1) predisposition towards learning, (2) structuring information so the learner can grasp it, (3) effectively sequencing materials, and (4) the nature of pacing rewards and punishments. The principles of his theory indicate that instruction be framed around experiences and contexts that make the student willing and able to learn. The instruction should be structured in spiral organization so information can be easily grasped. The design should facilitate extrapolation and or fill in the gaps going beyond the information given.

Vygotsky's Zone of Proximal Development (ZPD) theoretical model was devised to explain childhood development based on the ability to learn socially-relevant tools and culturally based-signs (Doolittle, 1995; Wass, Harland & Mercer, 2011). Vygotsky proposed that the child's immediate potential for cognitive growth starts on the lower end of a continuum where the child can accomplish learning on their own and progressing to the higher end the child can achieve cognitive growth with the help of others that are more knowledgeable (Doolittle, 1995;

Vygotsky, 1978). The zone of proximal development addresses learning and cognitive development and was described by Vygotsky (1978) as "a distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more knowledgeable others" (p. 86).

A child develops cognitively through exposure to tasks, then begins to learn a task requiring a significant amount of assistance in order to complete the task; as the child learns to complete the task less and less assistance is required until no assistance is needed, the child's cognitive skills develop. Vygotsky (1987) stated, "What lies in the zone of proximal development at one stage is realized and moves to the level of actual development at a second. In other words, *what the child is able to do in collaboration today he will be able to do independently tomorrow* [italic added]" (p. 211).

Vygotsky's ZPD was applied in a study (2006-2008) that involved twenty-six zoology undergraduate students over 3 years examining how their critical thinking developed. During their first year there was numerous hands-on experimental work, computer simulations and guided instruction. In this study Wass et al., (2011) reported in year 2 and 3 undergraduates collaborating with peers and lecturers extended their ZPD for critical thinking. Key scaffolds starting in the first year were formal problem-solving activities, eventually leading to second and third-year research activities that were supported by teachers and peer interaction integrating ideas through discovery while developing critical thinking (Wass et al., 2011).

In a review of publications, Sadideen & Kneebone explore the role of educational theory in promoting effective learning in practical-skills teaching. In this review the authors describe the process of how a core surgical practical skill relevant to all learners is acquired. First, during the cognitive stage, the learner processes the task and is able to perform the steps of a task in distinct

steps with erratic performance. However with repetition and feedback from the trainer, the learner is able to integrate knowledge and motor behavior. Gradually the performance will become fluid and the learner will be able to perform more autonomously. Expert performance represents the highest acquisition of skills where many professionals probably do not attain true expertise in skill acquisition (Sadideen & Kneebone, 2012). The authors suggest this model is useful for conceptualizing core skill acquisition. For example: learning the crash cart contents and equipment initially, then learning the documentation in a code, then progressing to the emergency drug box. This allows the novice nurse to explore their own personal development while in their own ZPD, before progressing to the next level of competency. Each nurse may require different levels of peer-support and trainer-prompting until they can master the skill (Sadideen & Kneebone, 2012).

Jonassen's (1999) work in constructive learning environments (CLE) supports learning through knowledge construction and emphasizes that learning should be authentic, meaningful and contextual. Jonassen's proposed a model for designing CLE's comprised of six essential components: (1) the problem context, (2) related cases, (3) information resources, (4) cognitive tools, (5) conversation tools, and (6) contextual support. Jonassen's other contribution in the field of constructivism was his examination of Objectivism versus Constructivism: Do We Need a New Philosophical Paradigm where he explores the shift away from objectivism toward constructivism and its impact in the field of instructional systems technology (1991).

Jonassen compared and contrasted the philosophical assumptions between objectivism and constructivism. He argued that one of the most important instructional prescriptions in instruction is the use of relevant contexts and real-world environments that should have contextual meaning for the learning experience. Jonassen concluded that instructional designers should consider both the nature of learning and the context in which it will occur. Before

committing to one theory or another, one should make a decision based upon the context (Jonassen, 1991).

Constructivist claim learners can only interpret messages in reference to their own experiences and knowledge by constructing meaning relative to their own needs, desires and histories. Their interpretation will be individualistic, and instructional designers can help by constructing meaningful and functional representations of the authentic world (Jonassen, 1991). It has been argued by many, that trainees are more likely to acquire a skill based on a similar previous learning experience, thus it would seem sensible for trainers to provide analogies when teaching practical skills (Sadideen & Kneebone, 2012). The following constructivist models will be used in this study to identify the participants and to frame the instructional design used in this research.

Patricia Benner (1984) developed a model based on the Dreyfus model of skill acquisition. Benner's model was the framework used for identifying the level of nursing experience in which guided the selection of participants for this research. This constructivist model depicts the various levels of skill acquisition that nurses progress through based on their experience, knowledge and beliefs.

The Dreyfus model of skill acquisition is a situational model that Patricia Benner (1984) applied in her research of clinical nursing practice. The Dreyfus model identified five progressive levels of proficiencies: novice, advanced beginners, competent, proficient and expert. Benner's model posits that as an individual begins to learn a skill, they first rely on the rules governing the situation and then how and when to apply them. As the skill improves the individual relies less and less on rules and more on intuition and experience (Benner, 2004). Benner (1984) described in her works "From Novice to Expert" what it means to be an expert

nurse. For the purpose of this study, her model, “Novice to Expert”, was used as a framework in identifying the participants for the study.

Benner’s model consists of the following five stages that provide a framework to understand how skills and knowledge are acquired in clinical nursing practice.

Level 1: *Novice*

The nurse has no experience and their actions on based on rules to guide their actions. They do what their told and follow instruction.

Level 2: *Advanced Beginner*

The nurse has marginally acceptable experiences that can be applied in similar situations. The advanced beginner cannot prioritize actions.

Level 3: *Competent*

The nurse has been on the job within similar area for approximately 2-3 years. Principles begin to formulate to guide decisions based on recurring experiences. Their actions and plans are more conscious and deliberate.

Level 4: *Proficient*

The nurse has been on the job within a similar area for approximately 3-5 years. Their perspective is based on previous experience and recent events. These nurses are best taught through case studies.

Level 5: *Expert*

The nurse has more than 5 years on the job. The nurse no longer relies on rules, principles or guidelines to make nursing decisions. With a vast amount of clinical experience and intuitiveness the nurse has a deeper understanding of the whole situation.

As the nurse moves through these levels they are constructing their knowledge based on concrete experiences, viewing the whole situation instead in parts, and moving from an observer

to an active participant. It is understood that a nurse could have the expertise in one area, however still be a novice in an unfamiliar area.

The Layers of Negotiation model (Cennamo, 2004) guided the design of the instruction along with Keller's ARCS motivational design for learning and performing (Keller, 2010). The Layers of Negotiation Model is a systematic approach to design that proceeds through the stages of analysis, design, development and evaluation in a spiral, layered fashion. This client-centered design model does not proceed in a linear fashion, but rather it is iterative by nature.

The authors that developed the "Layers of Negotiation Model" documented and described the process of designing instruction in a constructivist environment and the model's evolvement based on Driscoll's work (1994) incorporating it into their own design process (Cennamo, Abell, & Chung, 1996). This constructivist model is grounded on what is known about the process of constructing knowledge and what the author believes drives the process of instructional design (ID). Social negotiations and participatory design is an integral part of the process (Cennamo, 2004).

Keller's ARCS motivational model for designing instruction was first introduced in 1984. This model consists of four steps (attention, relevance, confidence and satisfaction) for the designer to solve the learner's motivational problem. Keller's motivational design provides a framework to determine the most effective strategies to sustain attention, show relevance, produce confidence and increase satisfaction for the learner.

Nurses have reported a great deal of anxiety and lack of confidence in participating in a code blue (Huseman, 2012). Many nurses reported experiencing feelings of insecurity, fear of missing something, unfamiliarity with equipment, and the general disorganization during a code (Dwyer & Williams 2002). The ARCS model provides a framework in designing instruction and motivational strategies that will increase the confidence and satisfaction in the learner. The

novice nurse has a vested interest in mastering the crash cart and has the understanding of the relevancy in the task, however the lack of exposure prevents them from achieving the confidence and satisfaction they need to participate in a code blue.

There is a general consensus that motivation is an internal state or condition (sometimes described as a need, desire, or want that activates behavior and gives it direction) that causes people to think and behave a certain way (Graham, 1996). Deci (1996) believes that motivated individuals will engage fully in achieving tasks with interest and commitment.

According to Keller motivation incorporates emotional-based characteristics, psychomotor components, physiological components, and cognitive components (Keller, 2010). There is an assumption that motivation is involved in the performance of all learned responses. One of the most influential writers in the area of motivation is Abraham Maslow (1954). His humanistic perspective looks at motivation as hierarchical as individuals fulfill their basic needs for survival they move to other needs. Other motivation theories will be discussed later in this literature review.

Definition of Terms

The following terms will be used in this study:

Advanced Beginner: A person with some exposure to a given situation and who can apply knowledge to similar experiences. Demonstrates marginally acceptable performances based on recurring meaningful situations (Benner, 2004).

Attention: Getting the learner's attention and sustaining it, this includes: (1) perceptual arousal, (2) inquiry arousal and, (3) instructional variability (Keller, 2010).

Confidence: The learner believes they can succeed. Confidence provides a sense of self-worth and the ability to succeed. The individual components for achieving success are: (1) the

learning requirements, (2) the opportunities for success, (3) the learner's personal control (Keller, 2010).

Competent: Plans and actions are based more on previous experience. The nurse typically has exposure to similar situations for approximately 2-3 years and contemplates problems based on deliberate and conscious planning actions (Benner, 2004).

Expert: The expert has an intuitive grasp of the situation. They no longer rely on rules and guidelines (Benner, 2004).

External locus of control: The individual believes rewards are through luck, thru uncontrollable influences regardless of their achievement. Their fate is determined by chance or outside forces beyond their control.

Extrinsic motivation: Individual receives reward after completing a task. This motivation comes from the outside such as pay increase or recognition. The goal is a means to an end (Keller, 2010).

Internal locus of Control: The individual believes they are rewarded if they do a good job. The person believes they can control their own life.

Intrinsic motivation: Individual receives no apparent reward other than the activity. They have an intrinsic interest and the need for satisfaction that results from pursuing the given interest (Keller, 2010).

Instructional Design: "ID is the science and art of creating detailed specifications for the development, evaluation, and maintenance of situations which facilitate learning and performance" (Richey, Klein & Tracey, 2011, p 447).

Motivation: What people desire, choose to do and commit to doing. Motivation is an internal state or condition that activates behavior and gives it direction (Keller, 2010).

Novice: A person without any experience as it relates to the subject. Actions are based on rules. The rules guide behavior and performance but don't teach how to prioritize (Benner, 2004).

Proficient: Experience is based on working in similar area for 3-5 years. Learner perceives situations as wholes rather than in parts. Knowledge is based on experience and recent events (Benner, 2004).

Relevance: Responding to an individual's perceived needs. This includes (1) goal orientation, (2) motive matching and (3) familiarity (Keller, 2010).

Satisfaction: "Reinforcing accomplishment with rewards (internal and external)" (Keller, 2010, p.45). Strategies include: (1) increases the natural consequences to apply knowledge, (2) provides positive consequences using appropriate incentives that shape the behavior and, (3) equity ensuring that the outcomes are consistent and maintain consistent standards and consequences for the tasks.

SUMMARY

This study intended to design an intervention using motivational instructional design strategies for training nurses on the crash cart. The fact remains that nurses still continue to report feelings of anxiety and decreased levels of confidence when using the crash cart during a code blue situation. This study sought to find a solution by developing meaningful training that would address their concerns and fears. The conceptual framework that guided this study was derived from motivational theory as it relates to instructional design. The five research questions posed, help to frame this study by examining the following: the levels of motivation, the impact of ARCS motivation design in crash cart training, and improved outcomes using an iterative design process. A review of theoretical constructs and definitions of terms were provided to frame the research problem. Chapter 2 contains the study's comprehensive literature review what

is known in the field of instructional design, motivation and what is known about crash cart training.

CHAPTER TWO

LITERATURE REVIEW

This study was designed to assist instructional designers and nurse educators in determining what impact motivational design has on crash cart training. A comprehensive literature review incorporated historical learning theories spanning over 50 years including definitions of motivation, as well as, current theoretical theories in instructional design. The literature review includes the ARCS motivational design along with the layers of negotiation model within the instructional design literature. In addition, it provides a review of the current trends and research conducted on crash cart training.

Motivation a Condition

Motivation has been at times described as an autonomous disposition, a condition that the learner controls, based on their needs and desires. There is a deep desire among investigators to explain what motivates peoples to do the things they do. Motivation refers to the choices individuals make on their level of engagement and the amount effort they will exert (Deci, 1975; and Keller, 2010). The magnitude and direction of the learner's behavior is determined by the individual's motivation. Hull's Drive Theory (1943) believed that motivation was a result of having a physiological deficit or a need (drive) that resulted in a direction (habit) to satisfy the need (behavior), (as cited in Graham, & Weiner 1996). Similarly, Lewin's Field theory 1940's, identified similar motivational factors impacting the motivational force as the state of tension (drive), a goal (valence) and psychological distance (habit) when a person experiences a need or desire. There are several motivation theories used to explain, predict and provide principles to guide the instructional designer.

Motivational theories can be grouped into four categories: (1) human physiology and neurology, (2) behavioral, (3) cognitive theories and (4) emotion and effect (Keller, 2010).

Motivation incorporates physiological components (hunger & arousal), psychomotor components (frustration & aggression), cognitive components (expectancies for success) and emotional components (fear & attraction), (Keller, 2010). Behaviorists believe primary biological responses are associated with stimuli that energize and direct behavior. Skinner focused on observable behaviors of the learner. Motivation, a function of anticipated rewards is a key principle in his operant conditioning theory. The rewards would increase the operant strength (Skinner, 1954).

In the early 60's a general shift occurred when researchers began to concentrate on human rather than nonhuman behaviors. Cognition was starting to be recognized as a key role in motivation. The focus was on understanding how information was processed in one's mind, how one feels and what motivates individual behavior. Expectancy-value theories viewed motivation as something that was determined by what one expects and the likelihood of getting it (Graham & Weiner, 1996).

Motivation can be divided into two types (a) intrinsic (internal to the person) and (b) extrinsic (outside the person). Self-determined behavior can be intrinsically or extrinsically motivated (Deci & Ryan, 1985). Intrinsic motivation and attribution was formed on the basis of the cognitivist view (Graham & Weiner, 1996). Intrinsic motivation has no apparent reward other than the activity itself or the pleasure of the activity driven by one's own volition (Graham & Weiner, 1996; Keller 2010; Garris, Ahlers & Driskell, 2002).

Motivation is said to be intrinsic when a self-initiated attraction toward a goal occurs because of an internal interest and the need for satisfaction. The motivation becomes intrinsic when there is a wish to engage in an activity that is pleasurable and rewarding. Deci (1975) explains that intrinsically motivated activities are "ones for which there is no apparent reward except the activity itself" (p. 23).

Extrinsic motivation relies on outside forces. There is an external goal that is more important than the task at hand. Completing the tasks for reward is the means to an end thus making the goal for the reason for the behavior (Keller, 2010; Visser, Plomp, Amirault, & Kuiper, 2002). Extrinsic motivation depends on the rewards that follow. They have instrumental value where the forces come from outside the learner and there is an external goal more important than the behavior itself (Keller, 2010; Visser et al., 2002).

Through this understanding, designers and practitioners utilize the theoretical works of motivation and design to explain, predict and possibly influence the learner's behavior. Educators must understand and accept that motivation is fundamental in learning and has been proven to impact and sustain human behavior and arousal. This is an important point to consider: for example, when two individuals are presented with the same instruction and similar abilities, the person who is motivated will likely succeed. Motivational design can assist in improving motivation to learn, work, and improve self-regulation including changing components of a person's personality (Keller, 2010). Motivational design focuses on specific strategies, principles, processes, and tactics for stimulating and maintaining the goal-oriented behaviors of learners (Keller, 2010).

There are several definitions of motivation found in the literature and in the instructional technology field, basically focusing on desire and/or effort, as well as commitment. Keller (2010) defines motivation as "that which explains the direction and magnitude of behavior, or in other words, it explains what goals people choose to pursue and how actively or intensely they pursue them" (p. 4). According to Graham and Weiner (1996), "Motivation is the study of why people think and behave as they do." (p.63). Ryan and Deci (2000) discuss the nature of motivation concerned with energy, direction, persistence and equifinality and is highly valued because of its consequences: motivation produces in the real world. Most motivation theorists

assume that motivation is involved in learned behavior and will not occur unless it is energized. The quandary is whether motivation is a primary or a secondary influence on behavior. With varying definitions of motivation and theories, instructional designers may struggle with the assumption that motivation comes from the learner and the designer may not feel the necessity to incorporate motivational strategies into their design in order to motivate the learner.

Maslow's Hierarchy of Needs

One of the most influential theorists in the subject of motivation is Abraham Maslow (1954). Maslow developed a concept of human needs placed in a hierarchical fashion consisting of five levels. Most often this theory is depicted in a pyramid formation with the basic needs starting at the base then progressing to higher level of needs. Maslow's belief that basic needs such as: food, water and shelter had to be fulfilled first in order to proceed to the next level. He argued that the search for knowledge would be impeded if other motivations for survival were not met or were more pressing. The five levels of needs are:

1. *Physiological needs*: food, water, sleep
2. *Safety needs*: security of body, resources, property
3. *Love and belonging needs*: friendships, family, sexual intimacy
4. *Esteem needs*: confidence, respect of and by others, achievement
5. *Self-actualization needs*: reaches one's highest potential, problem solving, and self-awareness

Figure 1

Maslow's Hierarchy of Needs

Adapted Maslow's Hierarchy of Needs (1954)

The first basic level of need is the physiological need. Basic human needs for survival are found in this level. Once the individual has met their need for food, shelter and water they can proceed to the next level. People cannot exist without these needs being fulfilled. A person that is without food and water will seek nourishment until their need has been satisfied then proceeding to the next level.

The second level is the need for safety. When the individual no longer worries about meeting their physiological needs they begin to secure resources continuing to meet their lower level needs. They may begin to seek job security, secure safe environment to reside, and look for stability. A feeling of security provides a sense of power needed to move to the next level.

The third level is a need for love and belonging. At this level friendship, family and intimacy needs are being met. People have the need to be loved and feel a sense of belonging in order to develop their relationships. If love is not experienced the person may feel unworthy, not accepted and this prevents meeting the need for self-esteem.

Self-esteem is the fourth level that includes confidence, achievements and respect. Without self-esteem a person would not feel good about achievements or self-worth. If this need

were not met it would get in the way of pursuing goals and having confidence to succeed. When a person has self-esteem they are empowered by their confidence and drive to meet the highest level that is self-actualization.

Self-actualization is the highest level in Maslow's theory, which by adulthood one should eventually meet. This does not mean everyone does. At this level the individual strives to meet their dreams, they are concerned with their personal growth and fulfilling their own potential.

From a practical application this theory helps the instructional designer to understand that students at the forth level of this model cannot be fully activated if the person never eats enough, or is afraid or isolated from their peers. However Keller (2010) explains the theory is highly subjective. Herein lays the challenge: to understand what is meant by a satisfied need. In other words, a person may be deprived of basic needs and still be highly motivated for example, a starving artist (Keller, 2010). Most importantly instructional designers need to understand and recognize that a satisfied need is not a motivator of behavior.

Figure 2

Maslow's hierarchical needs of a nurse

Self-actualization	Interested in fulfilling their potential
Esteem	Social recognition
Love & belonging	Have sense of belonging with peers
Safety	Feel secure in work environment
Physiological	Nurses should feel rested and nourished

It is assumed that nurses who have completed their education have proceeded through these five levels. It would be the instructional designer's responsibility to help motivate nurses keeping in mind the nurses' basic needs while attending crash cart training. While a novice nurse enters into another community of learners as in the work place some of their basic needs must be maintained. The novice/beginner nurse must feel rested and their physical needs be met in order

to concentrate on learning. As a nurse educator, I have seen firsthand nurses' attention levels dwindle, because they did not eat prior to training and their energy levels decreased.

Nurses also need to feel safe and secure in their environment so they will be able to concentrate. This means that they need to feel a sense of security to practice and make mistakes without punishment or judgment. Often nurses will not reveal a mistake if they feel there is going to be punishment.

A sense of belonging provides an environment for cooperative learning. The feeling of inclusiveness makes it easier to participate. Being socially recognized by peers is important as it provides mutual respect and camaraderie. Often seen in a new job, a new nurse will identify and socialize with their nursing peers rather than non-nurses. Lastly, if these basic needs are met, nurses will be interested in fulfilling their potential, focusing on problem solving and skill acquisition.

Intrinsic Motivation

Humanistic theorists believe intrinsic motivation to be either internal or biological in nature, to develop inherent capacities that are central to self-determination and self-enhancement. The force of motivation comes from within the individual who desires to engage in an activity that is pleasurable. Intrinsic sources and related theories can be categorized into body or physical, mind or mental or spiritual which the following chart depicts (Figure 3).

Figure 3

Sources of Motivational Needs

Sources of Motivational Needs	
Behavioral/external	Elicited by stimulus associated/connected to innately connected stimulus Obtain desired (reward) or avoid (consequences)
Biological	Increase/decrease stimulation Activate senses Decrease hunger, thirst, etc.
Affective	Increase/decrease affective dissonance Increase feeling good Decrease feeling bad Increase security of or decrease threats to self-esteem Maintain levels of optimism and enthusiasm
Cognitive	Maintain attention to something interesting or threatening Develop meaning or understanding Increase/decrease cognitive disequilibrium; uncertainty Solve a problem or make a decision
Conative	Meet individually developed/selected goal Obtain personal dream Take control of one's life
Spiritual	Understand purpose in life Connect self to ultimate unknowns

Note: (Author unknown no date)

Some of the basic foundations of intrinsic motivation theory are derived from Weiner's (1974) attribution theory, Bandura's (1977) self-efficacy theory, and Vroom's (1964) expectancy theory. Motivation plays an important role in the healthcare workforce (Lambrou, Kontodimopoulos, & Niakas, 2010). When a novice or advanced-beginner nurse anticipates a new task they are intrinsically motivated to reach this goal because of their inexperience and desire to master the task. They are guided by their beliefs about what they can do and they can anticipate what the outcome will likely be.

Bandura (1993) discusses whether a student believes in their own efficacy and self-regulation ultimately will determine their own level of aspirations, motivation and academic achievements. The physical actions a novice nurse undertakes while performing a medical task

creates enough pleasure and satisfaction for the nurse to continue to pursue more activities. Bandura (1991) "The stronger the perceived self-efficacy, the higher the goal challenges people set for themselves and the firmer is their commitment to them" (as cited in Bandura, 1993, p. 118). When a nurse perceives acquiring clinical skills successfully as an element they can control internally, the nurse's intrinsic motivation will eventually increase (self-efficacy). Nurses' attitudes toward training influence self-perceptions of their skills (Wenbe-Janek, Lenzmeier, Ogden, Lambden, Sanford, Herrick, Song, Pliego, & Colbert 2012).

Keller (2010) believes that before a learner can be motivated to learn, they need to believe in the relevancy and value of new knowledge as it relates to their own personal goals or motives and they must feel connected to the environment. Even if the learner sees relevancy and value, it still may not be enough to motivate the individual due to other factors such as level of confidence or expectancy for success (Keller, 2010). The intrinsic factors are often overlooked and are powerful in enhancing self-esteem, self-efficacy, and feelings of success through competency or mastery (Bandura, 1988; Keller, 2010).

Weiner's (1974) attribution theory as applied to motivation as a causal search determining the cause of success or failure. This search is most likely to occur when there are events that result in failure (Graham & Weiner, 1996). If the nurse is not successful in a clinical task the challenge then becomes maintaining internal motivation so the nurse will continue to exert efforts in achieving goals. Unsuccessful attempts, difficulty in task or perceived ability can result in low self-esteem that can hinder success.

Expectancies and incentives determine motivation by examining the perceived value of a goal and the behavior that will lead to outcomes (Keller, 2010). If the nurse values nursing excellence and perceives that acquiring certain clinical skills will make a better nurse, she or he will be motivated to perform behaviors that will lead to becoming a better nurse. Expectancy and

personal value are multiplied by each other resulting in the level of motivation. If the probability of success is greater than obtaining the goal the strongest motivation value wins and is expressed in behavior.

Extrinsic Motivation

Extrinsic motivation emerges when individuals engage in tasks for the rewards that follow completing the tasks. Rewards have instrumental value to the person, and reaching goals are a means to the end (Keller, 2010). The force of motivation comes from outside the learner where the goal is more important to the learner than the process of reaching the goal (Visser et al., 2002). Examples of extrinsic rewards include: promotion, financial incentives or recognition. An example of extrinsic motivation is when a nurse is offered tuition reimbursement from their employer for obtaining an advanced degree contingent on maintaining a certain grade point average while working and going to school.

The extrinsic reward also impacts the intrinsic motivation leading the nurse to become more satisfied with a sense of self-determination and accomplishment. Extrinsic rewards can also undermine the effect on intrinsic rewards (Keller, 2010). For example, if contingencies are used to manage another person's behavior putting the control in the hands of the performance manager, the person's sense of internal locus of control is compromised leaving the person less satisfied or interested. Extrinsic rewards can have positive or negative impact on intrinsic motivation based on whether the reward has an informational (feedback) or controlling (approval) effect (Keller, 2010). If the function of the reward becomes more controlling, the more intrinsic motivation is undermined, and likewise the more informational the reward, the more motivation is enhanced. Demotivation occur when rewards governing a behavior are violated and thus resulting in a performance affected by the relationship.

Expectancy Theory

The expectancy-value theory focuses on outcomes, and holds a major position in the study of motivation. Vroom's (1964) model Valence-Instrumentality-Expectancy model (VIE) postulates that individuals make choices or perform a task when the expected outcome is appealing and desirable to them and they have a positive expectancy for achieving it (Keller, 2010). The relationship of these concepts valence, instrumentality and expectancy is multiplicative in which behavior potential (motivation) is a function of expectancy multiplied value [(BP=f(E x V)], (Keller, 2010).

Valence is the affective orientation toward outcomes, the importance of various factors such as: attractiveness, desirability or anticipated satisfaction that will affect both expectancy and instrumentality (Van Eerde & Thierry 1996). Motivation is the outcome of how much the person wants the reward (valence) after achieving the goal. In other words it is the expectation and not the actual satisfaction that one expects to receive.

Expectancy is based on the assumption that the better the efforts put forth the better the performance will be. It is the assessment that the likelihood that an effort will result in the expected performance (Van Eerde and Thierry 1996). Expectancy is influenced in the workplace by many factors such as a nurse possessing knowledge and skills to perform the job or having available resources, information and support for novice nurses.

Instrumentality is based on faith that, if an individual performs well, then a valid outcome will result. It can be affected by factors such as performance, outcomes and the probability to achieve the outcome. Factors that affect nurses in the workplace are clarity of goals and outcomes. Many times a novice nurse may struggle with outcomes due to their inexperience and lack of knowledge. A nurse that believes they have some control over their performance (internal locus of control) will be motivated to strive to achieve desirable outcomes. Those who do not

believe they have control over their environment due to extraneous factors (external locus of control) will not be intrinsically motivated to perform well because luck or fate guides their behavior. For example, an unsuccessful attempt at starting an intravenous line would be viewed as chance or bad luck and not a skill. As seen many times in clinical settings, the more unsuccessful the attempts, the more the nurse becomes discouraged and avoids the task. The expectancy theory has many implications in designing training materials and increasing performance for instructional designers. With a clear understanding of how the VIA model can impact motivation in the learner and the relationship between expectancy, instrumentality and valence, training can be designed with motivational strategies that will enhance the likelihood of success.

Attribution Theory

Attribution theory proposes that individuals try to explain success or failure of self and others through ascribing certain attributions (Graham, & Weiner 1996). This cognitive theory builds on observations that people ascribe their success and failures to their own ability or to others efforts (Keller, 2010). These attributions can be either internal or external and are either under our control or not under our control. Weiner (1986) studied causal attributions and the relationship to student motivation. His research focused on how students perceived or interpreted situations or outcomes and identified achievement attributions as their abilities, effort, task ease or difficulty, luck, mood, help or hindrance from others (Graham & Weiner, 1996). There are three dimensions of causality: locus, stability and controllability that are perceived causes of success and failure (Weiner, 1985).

A personal belief in self-efficacy (capabilities) influences causal attributions. If one believes they are highly efficacious they will attribute their failure to insufficient effort. On the other hand one who regards themself with low efficacy, attributes failure to low ability (Bandura,

1977, 1982, 1988). The personal belief of self-efficacy can impact motivation, performance and affective reactions in determining how much effort is applied in a task, as well as the length of perseverance.

Weiner (1985) identified in his attribution theory four dimensions: ability, effort, task difficulty and luck. The first two are internal and relatively stable; the latter two are external and unstable (Keller, 2010; Weiner, 1985). What this means is that internal stable attributions are not easily subject to change and the external unstable attributions are subject to change.

For example, when transitioning a student nurse into a RN, the novice nurse starts out in an acute-care setting managing one patient because they have the confidence and ability to do so and the task at hand would not be too difficult. On the other hand, if the novice nurse were to start with several patients their confidence and ability would be low, the difficulty of the task would be high and unstable resulting in anxiety and poor outcomes. The effort required in the latter case is unstable and lots of encouragement and support will increase nurse's efforts as the difficulty of the external task increases. Weiner (1985, p. 551) postulates, "that ability may be perceived as unstable if learning is possible", as in the above example the nurse learning to manage more than one patient.

If the nurse perceives his or her own skills are insufficient, the nurse is more likely to forget the skills or lack the confidence needed to perform the skills. Simple tasks or procedures become overwhelming for the nurse such as opening a package, locating equipment or performing a task leading to frustration impeding their ability to critically think (Strzyzewski, 2006).

An individual may realize they do not have the personal resources to complete an intended task, Ajzen (1991) described this condition as *perceived control* (Dwyer & Williams, 2001). Key determinants of perceived control are: knowledge, confidence, skills, ability and

experience (Dwyer & Williams 2001). In other words if nurses believe they are capable of performing competently in a code (perceived ability) and they believe that the task is easy for them to perform (perceived difficulty) then they are more likely to engage in the behavior.

Code Blue Training in the Workplace

Motivating individuals in the workplace presents many challenges that cannot be addressed in this study. Upon reviewing several motivational theories it became clear that researchers and scholars alike have sought to understand what motivation is and have identified extensive strategies to increase motivation in individuals. It is well known that there are just as many internal and external factors that influence an individual's motivation. Instructional designers must understand that participants' feelings and perceptions regarding the training are just as important as the external elements such as content, environment, and support that will influence the motivation of the learner.

Typically, in healthcare settings the nurse educator is responsible for designing, developing, and delivering training for nurses. The entry level for most nurse educators is an undergraduate nursing degree and varying levels of nursing experience among organizations. Most nurse educators do not have a background in instructional design, although they do possess the clinical knowledge, and often do have some formal training in education. Sadideen and Kneebone (2012) concluded in their review of educational theories and teaching in contemporary surgical education that utilizing educational theories would make medical educators more effective trainers. Dwyer & Williams (2002) agree that educators need to focus on all aspects of the theories that focus on staff attitudes, past experience and perceived control issues. In fact, nurse researchers should not focus merely on the efficacy of teaching methods but, also examine strategies that motivate nurses to attend training with positive attitudes toward learning (Dwyer & Williams, 2002).

As part of new employee orientation there is a significant amount of training that is provided based more on the needs of the organization and not necessarily based on the individual needs of this new employee. Regulatory bodies have certain requirements that organizations must provide specific information to their new employees. Part of that training involves code blue training and utilizing the crash cart.

Much of the literature focuses on mock code blue training often reporting results related to anxiety, satisfaction and confidence levels of the nurse. Strzyzewski (2006) discusses that it's not unusual for a nurse to become nervous and lose their confidence during codes. There is an abundance of literature that discusses code blue training in healthcare however the literature does not effectively address how to reduce the anxiety levels and increase the confidence levels in nursing. There is a lack of research involving design strategies focusing on learning or mastering the crash cart that are available, even though many studies report unfamiliarity with the cart is very problematic for nurses.

In 2007-2008 a pilot study exploring nurse perspectives on code blue training through an inter-professional simulation program reported that hands-on practice was most valuable. For a six-month period a program was implemented at Scott & White Memorial Hospital (SWMH) with medical-surgical nurses (n=360) participating in one 3-hour session a week for 3 weeks. This mix-methods study provided results that supported the implementation and continued use of inter-professional simulation programs in hospital settings (Wehbe-Janek, Lenzmeier, Odgen, Lambden, Sanford, Herrick, Song, Pliego, & Colbert 2012).

Nurses' narrative responses reported hands-on practice and experience (39, 18.4%) as the most valuable aspect of the training sessions. The simulation enhanced their knowledge and skills "to become familiar with the proper procedures, algorithms, meds and crash cart" (Wehbe-Janek et al., p.46). Increased confidence and comfort (15, 7.1%) was reported, "I feel more

confident in using the crash cart and knowing the location of things in the crash cart" (Wehbe-Janek et al., p. 45). Deliberate practice via simulation was shown to improve the competence of doctors in procedural skills and enhanced their quality of patient care in an actual code (Wayne, Didwania, Feinglass, Fudala, Barsuk & McGaghie, 2008).

Lack of confidence and comfort was expressed during the needs assessment prior to the training. Nurses completed an evaluation on the program in which 98% responded strongly agree and agreed that training increased their familiarity with the equipment used during a code blue event. Because of this study SMWH has implemented a mandatory code blue simulation training program for all new nurses as part of general nursing orientation (Wehbe-Janek et al., 2012).

Strzyzewski cited that many common errors made during a code blue are attributed to nervousness, lack of confidence, failing to anticipate what is needed next in a code blue (2006). Strzyzewki recommends that knowing what is in the drawers of the crash cart and reviewing the contents frequently will increase confidence in a code blue situation (2006). Struggling to unlock a crash cart and fumbling through each drawer is not only frustrating to a nurse, but also to the rest of the code team (Strzyzewki, 2006). Others have found that cardiac arrests occurring in low volume, with high risk tasks, create high anxiety for staff however annual hands-on approach simulations will enhance staff confidence (Adams, Dobbs, Greene, MacGillis, & Stockhausen, 2002; Badger, 1996). Debriefing after a mock code blue was found to relieve some of the stress and allowed time for nurses to view the contents of the crash cart and practice with the available equipment (Hill, Dickter & Van Daalen).

Granneman & Conn (1996) conducted an experimental design study, using a convenience sample of 48 nurses in a Midwestern metropolitan hospital that sought to examine the effectiveness between the two different types of mock code programs. The group-training program was compared to competency-based education (CBE). The group format is more

common for code blue training, however it does not accommodate different rates of learning whereas the competency-based training focuses on the ability of the RN to apply their knowledge and skills (Granneman & Conn, 1996).

The purpose of their study was to see if the CBE would improve retention of code-blue skills 6 month after the training in comparison to the traditional group method training. Eighty-three percent of the nurses had not participated in a code blue during the last 6 months prior to the experiment. Nurses were divided up into both groups and evaluated 6 months later. There were no significant findings between both groups in performance, timed responses for critical tasks and safety precautions, however the largest difference reported was the comfort level with code blue skills. The Visual Analogue Scale (VAS) score was reported at 40 VS. 48 (means mm) for the CBE training (Granneman & Conn, 1996). Nurses reporting the lack of comfort and confidence are consistent with other research findings (Strzyzewski, 2006 and Wehbe-Janek et al., 2012). This study demonstrates that the lack of code blue experience in the past six month as it relates to comfort may have more to do with the frequency of exposures than with the training program itself and should be examined more closely.

At Mercy San Juan Medical Center in California a pilot study was conducted focusing on nurse readiness training for pediatric resuscitation (von Arx and Pretzlaff 2010). There were 27 participants, consisting of: 6 physicians, 3 pharmacists, and 18 nurses, in which only 1 nurse had participated in a pediatric code blue in the previous 2 years. The program was a half-day training that included lecture, four mock code scenarios and debriefing sessions. Debriefing is vital in learning the process of a code blue where everyone can ask questions and practice with the equipment (Hill, Dickter, & Van Daalen, 2010). Pre and post surveys were conducted to gauge perception of improved comfort and knowledge along with survey questions on confidence and

comfort using 7-point Likert scale. Results from the two-sample Wilcoxon rank sum testing indicated improvement in participant comfort and knowledge for all questions.

Interestingly enough, looking at the pre survey the participants indicated that their comfort level in participating in a code, comfort in finding equipment, and confidence in using the equipment, scored lowest 3-3.8 on a 7-point Likert scale. Even after the training the improved scores remained lower than the other survey questions: understanding their role, participating in a pediatric code, confidence in facilitating a code and improved skills. The authors concluded that comfort and confidence is an important determinant in staff performance during a code blue (von Arx and Pretzlaff 2010). Although the study showed improved comfort and confidence levels, further research should involve the maintenance of confidence and comfort levels after training.

Huseman (2012) conducted a single-sample, quasi-experimental, descriptive design seeking to answer the research question: "Does performing mock codes improve response time to code blues?" (p.120). Participants were selected as they participated in mock code blues or actual code blues. Retrospective chart reviews were conducted examining baseline response times, from onset of absence of pulse, to chest compressions, to first drug administration that were recorded during a 3-month period (pre-training). Staff then participated in 3-month code blue training drills using patient simulator. At the end of training, response times were recorded during actual code blues (post training).

Findings revealed there were significant differences between the pre-training and post-training for the start of compressions, first drug administered and defibrillation. Pre-training, the onset of pulselessness to the initiation of chest compression was 0.867 minutes improved by mean response time 0.214 yielding 25% post-training improvement. Results for administrating the first drug pre-training was 4 minutes to 0.929 minutes post-training improved by 23% and

defibrillation improved by 30% after training. However improved performances in the maintenance period declined slightly in the mean responses of compressions, drug administration and defibrillation. Confidence and satisfaction was not measured although the authors reported nursing staff expressed positive feelings toward the training. The authors recommend educators be aware of the deterioration of skills post-training recommending periodic reviews (Huseman, 2012).

At a regional medical center in Washington State nurse educators applied adult learning theory and accelerated learning techniques to enhance the nursing staff's familiarity with emergency equipment and procedures (Keys, Malone, Brim, Schoonover, Nordstrom & Selzler, 2009). The nursing staff on the medical-surgical, telemetry, pediatrics, obstetrical and behavioral health units felt ill-prepared for emergency events due to infrequent exposures. A series of activities to enhance staff's familiarity with the equipment and skills was implemented. Nurses are often expected to retrieve the medications from the crash cart and prepare them; therefore, it is critical for them to be familiar with the location and preparation (Keys et al., 2008). Some of the feedback the educators received from staff was comments such as: "they had never seen inside the locked drawers" and "they were afraid of the medication drawer and had never seen the contents" (Keys et al., p.562, 2008). The educators at this facility used adult learning theory and contextual learning as a framework for structuring the learning activities. This article provides a variety of strategies promoting learning, which include: providing a positive environment, contextual learning, gaming, feedback and learner involvement (Keys et al. 2008).

Instructional Design

There are many instructional design models and strategies published in the field. Even when instruction is based on instructional design principles, it can fail to motivate the student to learn (Omrani, Hemmati, Fardanesh, & Hemmati, 2012). When adapting a motivational approach in

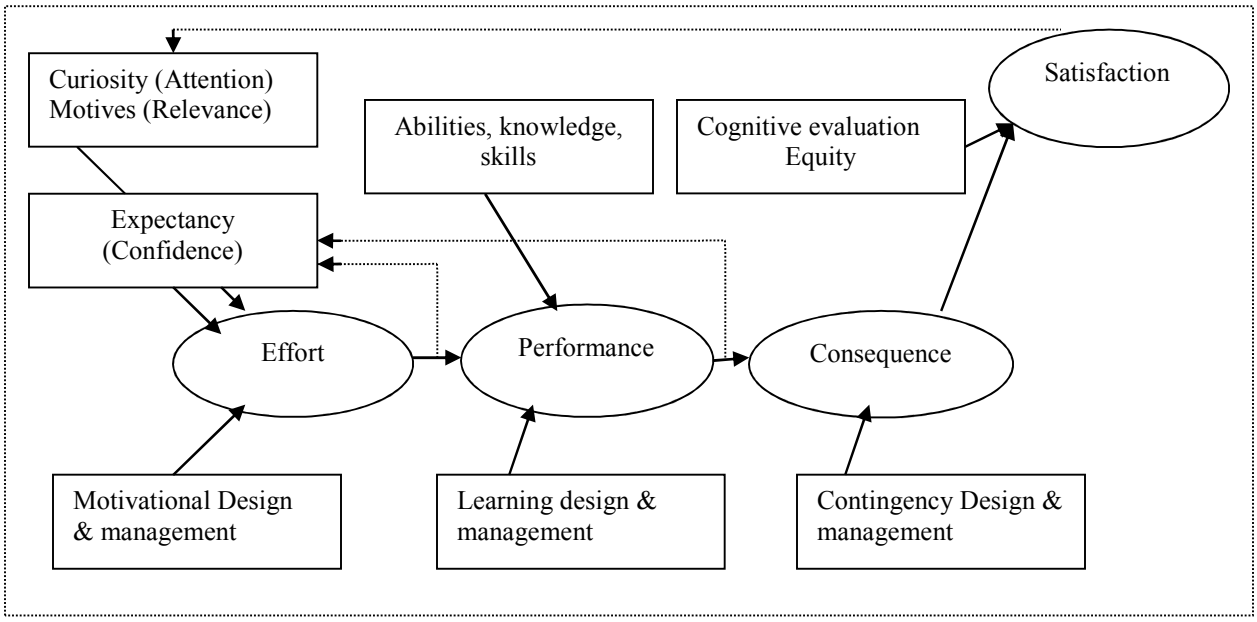
instruction, nurses can achieve corresponding success in learning, development in life-long learning and application of knowledge and skills learned in delivering patient care. A brief overview of motivational instructional design models that were utilized in this research study will be discussed in this section. Keller's ARCS motivational model and the Layers of Negotiation model were used as the framework for this study. Additionally, other instructional design strategies such as constructivism and situated learning are discussed utilized in this study.

Keller's ARC Model

This systematic motivational design model explains, predicts, and has a set of principles and processes that are derived from several theories such as behaviorism, cognitivism and humanism (Keller, 2008 & 2010). Keller expanded on Gagne's focus of the learner's ability to the learner's will (Keller, 1993). He also expanded his focus on motivation from Skinner's extrinsic view to an intrinsic one (Keller, 1979). Keller's review of the literature in cognitive psychology, social learning theory and motivation theory reveal that learners are affected by, not only extrinsic factors, but also by intrinsic factors (Keller, 1979). Because of his emphasis on a wide range of theoretical bases, Keller refers to his work on motivation as a theory and a macro model. Keller connected the theories systematically to key components of his own theory and design of the ARCS model. The ARCS model represents four categories: (1) Attention, (2) Relevance, (3) Confidence and (4) Satisfaction.

Figure 4

Keller's Macro Model of Motivation and Performance



Adapted from "Motivational Design for Learning and Performance: the ARCS Model Approach, Keller 2010, p. 10.

Keller's (2010) motivational design process is similar to traditional instructional design process involving several steps: (a) Define-conduct an audience analysis (is there a motivation problem with the instruction or learner?), (b) Design-analyze existing or design instructional materials, (c) Develop- design motivational strategies (brainstorming), (d) Pilot-implement tactics, evaluate and revise.

These design phases support the development of crash cart training in the proposed study utilizing the ARCS model to increase the confidence and satisfaction of the nurses. A review of the ARCS model will proceed with an in-depth look at the individual categories and their subcategories with underlying strategies. The first category is *attention.* Getting the learner's attention is a key element that must be present and ongoing throughout the instruction. Attention includes (1) perceptual arousal-use of strategies to gain initial interest; (2) inquiry arousal-a sense of mystery and progressive disclosure to increase interest; and (3) variability- use of variety to change the pace.

According to Keller before any learning can occur, the learner must be engaged (Keller, 2010). There are many strategies that can gain the attention of the learner such as giving specific examples, use of humor, unexpected noise or movement. Keeping in mind overuse of any strategy may become annoying or create boredom. It is critical to get the learner's attention and more so to maintain it. Once the basic level of attention is achieved then moving to inquiry arousal will lead to the relevance stage.

Figure 5

Attention Components

Concepts & process Questions	Main Supporting Tactics
A.1 Perceptual arousal What can I do to capture their interest?	Create curiosity and wonderment by using novel approaches, injecting personal and/or emotional material.
A 2. Inquiry arousal How can I stimulate an attitude of inquiry?	Increase curiosity by asking questions, creating paradoxes, generating inquiry, and nurturing thinking challenges.
A 3. Variability How can I maintain their attention?	Sustain their interest by variations in presentation style, concrete analogies, human interest examples, and unexpected events.

From: Motivational Design for Learning and Performance Keller 2010 p. 92.

The second category is *relevance,* which involves linking the content to the learner's needs and desires based on their goals, motive and values. The instructor must have a true sense and belief in the relevance of the instruction for the student to believe in it (Keller, 2010). Goal orientation is one of the subcategories that involve understanding what the learner's goals are. Clearly defined goals facilitate building connections between the content and the learner, however when goals are not so clearly defined with no immediate connection several, tactics can be utilized to develop connections to potential or actual goals (Keller, 2010). Another subcategory, motive matching, recognizes that individuals are more likely to be motivated if they receive personal recognition, and are valued as a person and contributor. The subcategory familiarity addresses personal experiences and the desire to confirm things already known and believed by the learner.

Figure 6

Relevance Components

Concepts & process Questions	Main Supporting Tactics
R.1 Goal orientation How can I best meet my learner's needs? (Do I know their needs?)	Provide statements or examples of the utility of the instruction, and wither present goals or have learners define them.
R 2. Motive Matching How and when can I link my instruction to the learning styles and personal interests of the learners?	Make instruction responsive to learner motives and values by providing personal achievement opportunities, cooperative activities, leadership responsibilities, and positive role models.
R 3. Familiarity How can I tie the instruction to the learners' experience?	Make the materials and concepts familiar by providing concrete examples and analogies related to the learners' work or background.

From: Motivational Design for Learning and Performance Keller 2010 p.126.

The third category is *confidence,* which provides a sense of self-worth and enhances the ability to succeed. Building confidence requires specific elements such as providing a trusting environment with clear objectives and expectations. The learner must believe they will succeed at the given task and feel they have some control over their environment. Students need to know through feedback if they are succeeding (Keller, 2010).

Figure 7

Confidence Components

Concepts & process Questions	Main Supporting Tactics
C 1. Learning Requirements How can I assist in building a positive expectation for success?	Establish trust and positive expectations by explaining the requirements for success and the evaluative criteria.
C 2. Successful Opportunities How will the learning experience support or enhance the learners' beliefs in their competence	Increase belief in competence by providing many, varied, and challenging experiences that increase learning success.
C 3. Personal Control How will the learners clearly know their success is based upon their efforts and abilities?	Use techniques that offer personal control (whenever possible), and provide feedback that attributes success to personal effort.

From: Motivational Design for Learning and Performance Keller 2010 p. 159.

The final category in the model is *satisfaction*. Several conditions must be met that relate to the expectations of the learner, in order for a learner to experience positive feelings toward the instruction. The designer incorporates elements of intrinsic motivation and extrinsic motivations in the design process while making the performance requirements consistent and equitable for the learner. The level of performance combined with the contingencies of rewards

determines the consequences of success leading to an expected outcome. Consequences that are cognitively evaluated with reflection determine how satisfied one is with the process, their performance and expectancies (Keller, 2008). The instructor would need to ensure that an evaluation process that clearly reflects performance associated by an equitable grade system is in effect (Hancock, 1995). The learner must believe that the outcomes are distributed equitably among others and evaluation criteria will be the same for all.

Figure 8

Satisfaction Components

Concepts & process Questions	Main Supporting Tactics
S 1. Intrinsic Rewards How can I encourage and support their intrinsic enjoyment of the learning experience?	Provide feedback and other information that reinforces positive feelings for personal effort and accomplishment.
S 2. Extrinsic Rewards What will provide rewarding consequences to the learners' successes?	Use verbal praise, real or symbolic rewards, and incentives, or let learner present the results of their efforts ("show and tell") to reward success.
S 3. Equity What can I do to build learner perceptions of fair treatment?	Make performance requirements consistent with stated expectations, and use consistent measurement standards for all learners' tasks and accomplishments.

From: Motivational Design for Learning and Performance Keller 2010 p. 189.

Omrani, Fardanesh, Nima Hemmati, & Naser Hemmati (2012) conducted a study that sought to identify an instructional design model for continuing online medical education in comparison to a traditional method. This research integrated instructional and motivational design models guided by Keller's ARCS model focusing on improving the quality of the electronic courseware design. This was a quasi-experiment with 60 general physicians and assistants all of them randomly assigned to either a control or experimental group (n=30) in June 2011. The data collected by pretest, posttest, and physicians' motivation questionnaires did not yield significant results between pretest scores of the two groups (11.37±1.42 VS. 11.73±0.69) although in the posttest learning there were significant differences between posttest learning scores (15.2±1.29 VS. 17.53±0.94, $p<0.05$) and motivation of physicians (126.10±3.97 VS. 160.63±22.41, $p<0.05$) in both groups. The latter group had a higher level of motivation and

requested more courses formatted the same way. The authors' recommendation that instructional and motivational design be used in future electronic medical education programs.

Wongwiwatthanaaanukit and Popovich (2000) demonstrated how ARCS could be systematically applied into pharmaceutical education. They contend that even in the best designed instruction that uses sound approaches it still may not be enough to motivate students to learn. Pharmaceutical education must facilitate acquisition of relevant skills and knowledge measured by performance- based competencies outlined by the American Association of College of Pharmacy's Commission. The commission's expectations for curriculum design must promote students' intellectual inquiry and curiosity and their motivation for life-long learning to enhance their professional development (Wongwiwatthanaaanukit and Popovich, 2000). The authors recommend that pharmacy educators must know how to make instruction more appealing and motivational to inspire lifelong learning in students. Other authors concur that it is critical to utilize current learning and teaching models in a climate where limited clinical exposures occur (Sadideen & Kneebone, 2012).

Keller's ARCS has been used in healthcare to assist nursing faculty to effectively teach the nursing process using National Council Licensure Examination for RNs (NCLEX) categories to undergraduate nursing students (Myrick, 2012). Although this article is not research, it demonstrates the practical application of ARCS for creating motivational instruction in nurse education. Myrick (2012) supports the use of ARCS and provides an appropriate framework for enhancing the teaching or learning experience in nursing education. She demonstrated this by using the components of ARCS model to delineate the NCLEX categories could be effective in promoting student learning.

Alexander (2000) discusses the use of scenarios for teaching principles of emergency management for bridging the gap between classroom instruction and practical training.

Scenarios are used to get the attention of the learner using past events as a means of testing the students' abilities to respond effectively to practical problems. Even though the author does not mention Keller's model, it's very clear that the approach to emergency training has many of its components. The author provides a framework for using a scenario for emergency training. The scenario [attention] is presented within the context of a past event/disaster (what, where, when and who?), providing a set of rules, roles and objectives for the learners, a time frame and responses required from the participants [relevance]. The students collaborate on decision making or solving the problem. The instructor can create situations of conflict or one of difference of opinion in order to teach participants how to mediate [confidence]. Depending how the scenario is structured it can target specific objectives. Scenarios are useful for testing and evaluating the student's ability to respond to problems effectively at the end of the training [satisfaction]. Although the focus of this example is the use of scenarios, it is important to note how Keller's model can be used to approach future emergency training.

The components of Keller's motivational model can be used systematically in conjunction with any instructional design model (Okey & Santiago, 1991). According to Okey & Santiago (1991), linking ideas of motivational design to instructional design theory produces both effective and appealing instruction. This motivational model will guide the instructional design process using the layers of negotiation model to frame the crash cart training.

Layers of Negotiation Model

The Layers of Negotiation model was developed by Cennamo, Abell, George, & Chung (1996) while designing instruction for a series of case-based interactive videodiscs to be used

within a constructivist learning environment. Cennamo et al., 1996, transformed Driscoll's five conditions that were identified for constructivist learning environments into five conditions for designing instructional materials from a constructivist's perspective.

The instructional design spiral process is dependent upon:

1. Embracing the complexity of the design process.
2. Social negotiations as an integral part of designing the materials.
3. Examining information several times from multiple perspectives.
4. Nurture reflexivity in the design process.
5. Emphasize client-centered design.

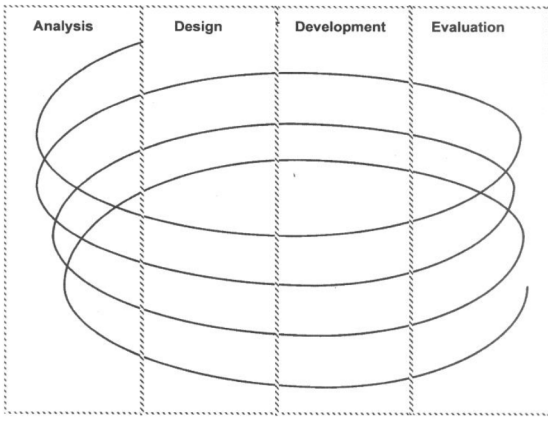
The authors believe instructional design should be guided by what is known about the process of knowledge construction (Cennamo et al.,1996; Driscoll, 1994). Furthermore, they contend that learners inherently come with their own understandings, beliefs, and values from previous learning experiences. Learning is a social enterprise. It is a process of sense making in which learners incorporate new information with existing knowledge as they interact with materials, instructors, and other learners. In order for learning to take place learners must first become dissatisfied with their existing knowledge and beliefs, and then move forward in the pursuit of a revised and satisfactory understanding. Designers must understand that meaning is not inherent in the learning materials rather the meaning is created by the learners. The process of designing materials should be consistent with constructivist theory.

This client-centered systematic approach proceeds through the stages of instructional design in a spiral, layered fashion that is iterative by nature. This approach allows the designer to revisit any phase for revisions at any time in the process. Decisions are not randomly made but purposeful, as they are based on negotiations and on how people think and learn. Ideas and objectives progressively emerge throughout the entire design and development process. In the

analysis stage, information is sought to provide insight to the design solutions. The design and development stage generates tentative solutions in which the clients or learners confirm or disconfirm (on going analysis), acting as a checkpoint occurring over and over until a solution is suitable. The role of the instructional designer is to understand the context of the instruction while working with subject matter experts within the team. The designer facilitates the process of collaboration, seeking answers to critical questions from the team while constructing knowledge to guide the development of instructional materials.

Figure 9

The Layers of Negotiation model of instructional design.



Note: Adapted from A "Layers of Negotiation" model for designing constructivist learning materials. *Educational Technology.* 36(4). Cennamo, Abell, George, & Chung (1996)

The authors recommend that designers progress into deeper layers in the process as additional information becomes available or relevant to the discussion. Addressing the questions of design in an iterative fashion allows the designer to progress through a series of steps at one level and then spiraling back to add more detail within (Cennamo, 2004 & Cennamo et al., 1996). Social negotiations are an integral part of the design process that includes the designers and clients exchanging their perspectives, reflecting and articulating their thought processes.

The layers of negotiation are a process that focuses on asking good questions, with the emphasis on the process of decision-making from multiple perspectives from the design team.

In a design-based case study utilizing the layers of negotiation model, Tracey and Unger (2012), demonstrated how this model was used for developing instruction for a cross-cultural workforce. The study took place in Dubai where a design team developed training on cleaning the mall for a diverse group of employees at the Dubai Mall. The challenge was to design cross-cultural instruction and training that would be used for four cultural groups employed at the mall. Key findings of this case study were that modeling and job aids had significant impact on the worker's performance, however building trust and communications among the groups of people was found to be essential prior to implementing the training. Additionally, the sequencing of strategies had a greater impact on worker performance than did their country of origin. This finding was attributed to the individual workers lack of knowledge and skill they possessed independently.

The use of the layers of negotiation model provided the designers opportunity to engage in continuous cultural education with key stakeholders and instructional design cultural experts throughout the design process. The significance of this research illustrated the instructional design process for designing cross-cultural training utilizing the layers of negotiation model and the challenges the designers encountered during the study. As globalization continues, there will be as more and more opportunities for designers to develop cross-cultural training (Tracey & Unger, 2012). The results from this study provide a working example on the sound instructional strategies employed by the design team and lessons learned, making this a valued contribution to the knowledge base of constructivists ID.

SUMMARY

This research study is designed to assist nurse educators and instructional designers in determining the impact of using Keller's model to improve the confidence and satisfaction of nurses learning the crash cart. This review used several search strategies that included literature on motivation, design strategies and focused on what is known about the current strategies used for crash cart training. The literature review presented historical learning theories over the last 50 years including definitions of motivation and theoretical theories in instructional design. The last section examined the current literature and research that has been conducted regarding crash cart training in healthcare. Keller's ARCS motivational design model and Cennamo's Layer of Negotiation Model were presented in this section and how it would apply to this research study. These models will frame the research and motivational instructional design to fill in the gap that the literature review revealed in crash cart training.

CHAPTER THREE

METHADOLOGY

Introduction

The purpose of this mixed-methods design-based research study was to determine whether or not motivational designed instruction for the crash cart would significantly improve the confidence levels of nurses. The goal of the designed-based research study was to utilize an iterative approach consisting of three cycles of: designing, development, implementation and evaluation. The comprehensive motivational instruction was designed using Keller's ARCS motivational strategies to enhance and support novice nurses in learning the crash cart. A mixed-methods approach was used to collect both quantitative and qualitative data to answer the following research questions:

Q 1. What is the current level of motivation and confidence for novice nurses using the crash cart?

Q 2. Is a mock code blue more effective than a motivational design approach to learning the crash cart?

Q 3. Does crash cart familiarity increase as a result of motivational training?

Q 4. To what extent does the ARCS motivation design impact nurse confidence regarding the crash cart?

Q 5. Does the iterative process of this designed-based research improve the outcomes for learning the crash cart?

The following sections provide an overview of the study's research methodology and details on: (a) rationale for mixed methods for designed-based research, (b) setting, (c) participants, (d) sampling process, (e) research design, and (f) data collection method. Before proceeding with

this study, I obtained permission from Wayne State University's Internal Review Board, the participating hospitals and met any additional requirements needed to conduct my research.

Rationale for Mixed-Methods and Design-Based Research

Mixed methods research, which combines quantitative and qualitative research techniques, are used to yield empirical results, as well as rich, and thick descriptive results through incorporating several strategies that seek to answer the proposed research questions (Johnson & Onwuegbuzie, 2004). In this study mixed methods were used to draw from the strengths of both methodologies to minimize weaknesses and produce more superior results. Both methodologies incorporated safeguards to minimize biases or invalidity through empirical observation to answer research questions, construct explanatory arguments and provide speculation based on the outcomes observed (Johnson & Onwuegbuzie, 2004). According to Morse (2003) the combination of qualitative and quantitative research strategies expands the dimensions and scope of the study. Morse discusses how using more than one method will provide a more complete picture of human behavior and experience, provided methodological congruency is maintained (Morse, 2003).

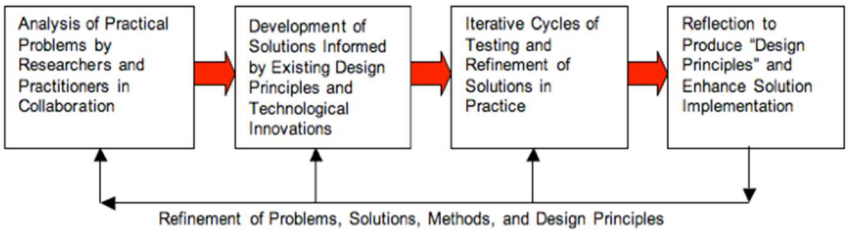
Design-based research is a methodology for carrying out educational interventions. This type of research focuses on design and assessment of critical design elements filling in the gaps that are needed to improve educational practices. Design-based experiments are contextualized in educational settings, and ethnography provides qualitative methods for examining how a design works in practice, and how social and contextual variables interact with cognitive variables (Collins, Joseph and Bielaczyc, 2004). This design-based research consisted of cyclic revisions through progression and refinement leading to a robust design over time (Collins et al., 2004). According to Collins et al., this approach provides an initial version of a design in the real world and seeing how it works, and then constant revisions are made based on the observed experience,

feedback, and data analysis until its perfected (2004). Design-based research looks at different aspects of the design identifying variables or characteristics of the situation involving participants in real life settings (Collins et al., 2004; Wang & Hannafin, 2005; Edelson, 2002).

Barab and Squire (2004) describe in detail how design-based research focuses on understanding the complexity of real-world practice, with context being central to the research. It involves flexible design revisions, multiple dependent variables and capturing social interactions. The participants are not viewed as subjects but rather as co-participants providing their feedback in the design, development, and revisions throughout the study. Design-based research relies on social interaction with participants sharing their ideas and involving other participants to actively design and develop materials based on their expertise (Barab & Squire, 2004). This type of research was developed to address several issues central to the study of learning (Barab & Squire, 2004; Collins, Joseph and Bielaczyc, 2004). Figure 10 describes the process of designed-based research and it's iterative nature (Reeves, 2006).

Figure 10

Designed-Based Research Model



Note: Adapted from Design research from a technology perspective by Reeves, T. C. (2006). In J. V. d. Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational design research* (pp. 52-66). UK: Routledge.

This research study is pragmatic in that it sought to generate solutions to real-world problems using ARCS motivational design for the improvement of crash cart training provided for nurses.

Triangulation methods

This study utilized quantitative and qualitative data collection methods through observations, surveys, and interviews including the participants' responses collected through the Course Interest Survey (CIS). The strategy of triangulating the data provides the researcher with a more in-depth look at the results and phenomenon by examining the data from several viewpoints. The nurses' motivation levels were measured through their responses collected from the CIS, the demographic survey, the semi-structured interview questions and the post survey questions. I used the CIS post-test to determine the motivational levels of the nurses after the training, so revisions could be made to the instruction for the next group of nurses. All data collected helped to inform me of the changes necessary to improve the instruction. After each training session the data were analyzed comparing the results between groups looking for improvement.

The nurse educators were asked to evaluate a supplemental crash cart booklet that was developed to enhance the training (Appendix R). Initially they were given a prototype booklet and asked to review the contents for accuracy and validity. The booklet contained extensive pictures of the hospital crash cart. The content covered roles and responsibilities of a nurse, frequently used code drugs, a CPR record form and procedures that the nurse can expect to anticipate and act on. The educators reviewed the booklet providing their feedback and suggestions to the design team. I met with the design team to make further revisions to the booklet prior to the training. The educators were given the Instructional Materials Motivational Survey to evaluate the final supplemental material.

I collected quantitative and qualitative data throughout each phase of the mixed method study, analyzing and documenting the results prior to moving to the next phase of the study. As the researcher I had very little control of the sample size, or the condition of the crash cart or when I would conduct the training. This was all dependent on the nurse educators, the

availability of nurses and the hospital. Participants were observed as they took part in the training, and the interviews provided more insight into how they felt about the training.

Setting

Two hospitals that are part of a large medical center in South Eastern Michigan, located in the Detroit metropolitan area agreed to participate in the study. Both of these hospitals have been servicing the community for more than 50 years. A letter of support from the Directors of Education for both hospital sites had been obtained (Appendix I). The hospitals will be referred to in the study as hospital D and as hospital H to maintain confidentiality and anonymity. Both hospitals are recognized as acute-care facilities with specialties in adult medical care for emergency trauma and critically ill patients as well as medical research and teaching.

According to the directors of education, new employee orientation occurs every six weeks that includes nurse specific training in both of these hospitals. At D and H hospitals, nurse educators are responsible for facilitating orientation and for providing training to the newly employed nurses and existing staff nurses. I was able to observe the code blue training offered at one of the hospitals during their orientation. The hospital training consisted of showing the nurses the crash cart during their orientation. The training sometimes involved a mock code blue training, however this was not consistently offered due to time constraints.

The training covered the contents of the crash cart, emergency drugs, how to use a defibrillator, documentation and included mock code blue. The educators would demonstrate how to use certain equipment, however there was very little hands-on experience for the nurses in which the training was approximately one hour. I noticed class size did not matter, and the training was no longer then the allotted time. Therefore, training sometimes did not cover all areas due to time constraints.

Follow up training for code blue usually occurred in the form of a random mock code blue during the nurses regular work schedule in the area they worked. In other words, the random mock code blues would only target those who were working at the time. As a result, a nurse may not be exposed to a crash cart until an actual code blue. The number of newly employed nurses varies monthly, which usually consists of all specialties and various levels of nursing experience and education. Based on my own personal experience working as a nurse educator at one of the affiliating hospitals and through personal communications with the educators at both hospitals, the process for orientation is consistent throughout the organization. Hospital accreditation occurs every four years with the Joint Commission, as well as several other regulatory agencies monitoring and ensuring that industry standards are adhered to. As part of the standards and expectations, code blue emergency training is one of the requirements.

Sampling Process

Approval to conduct research was granted by the Human Investigative Committee (HIC) (Appendix B) and from the nursing research committee representing both hospitals including additional approval granted from the medical research committee for the entire organization (Appendix C). A meeting with the directors of education and the site educators was scheduled for each of the sites. I met with the nurse educators from both sites to describe the research study and to determine the timeline and process of the research. We discussed how the participants would be identified and the dates for the training. Having two sites helped in achieving the sample size needed and keeping within a reasonable timeline. The educators identified those participants that fit the criteria of novice-advanced beginner nurses through convenience sampling; providing the opportunity for me to invite them into the study prior to the training.

I obtained from each participant a signed informed consent that described the study, outlined any risks and/or benefits of participation and explained that their participation in the

study was strictly on a volunteer basis (Appendix D). The goal was to have no more than five participants for each design phase. It was determined that the ideal ratio of 1:5, instructor to participant would be appropriate with the use of one crash cart that allowed the nurses full hands-on participation with the crash cart training. The educators decided ultimately on the participants and group sizes that participated in the training. The decision was made at site H that anyone who was in nursing orientation would attend the training, regardless of their employee designation, as long as they were in a nursing department providing patient care. However, if they did not meet those criteria, they were not required to participate in the research but did attend the training and received the supplemental materials.

Participants

The samples for this study included novice-advanced beginner RNs employed at both hospitals. Utilizing both hospitals prevented any delays or missed opportunities, and that allowed for the facilitation of the research process to occur, and provided a convenient selection of participants. For example, I was able to offer the instruction to one group of nurses at hospital H then subsequently to another new group of nurses at hospital D, thus avoiding delays. Any nurse that was a novice to advanced beginner (under one year experience) was eligible for inclusion into the study. Nurses that had less than two years of nursing experience, where there had been no exposure to code blues, was eligible to participate. For example, a nurse that had worked in psychiatric nursing for less than two years would have fit this criterion. Participants could volunteer to be part of the study from the orientation group, or as an existing staff nurse, or as a novice nurse in the intensive care unit (ICU) setting, provided they met the criteria of novice to advanced beginner nurse.

The only exclusions were, the experienced critical care nurses that had worked or were working in specialty areas, such as cardiac critical care or any other identified specialty areas,

with more than a year of experience, and with frequent exposures to code blues. The selection of participants was not dependent on any particular orientation group or any orientation schedule. It was more of a convenience sample identified from the educators and the availability of the participants.

Newly hired nurses generally receive some variation of training related to code blue and the crash cart during their hospital orientation. There were different entry levels of education that nurses had, ranging from an associate to undergraduate degree in nursing; however that did not impact the study since all nurses were licensed to practice in the State of Michigan. The rational for choosing novice to advanced beginner nurses was they have very little exposure to the crash cart if any at all; where as a more experienced nurse could have had impact on the results of the study.

I was aware that without incentives it would have been more challenging to recruit participants for the study. As an incentive, each participant was entered into a raffle for a gift certificate valued at one hundred dollars to a nursing uniform store once the study was completed. Each participant was fully informed at the time of their consent that in order to be part of the raffle they must complete the training and fully participate in the study.

Design Team

The design team was multi-disciplinary. As the lead researcher I have vast experience in nursing education, and as an instructional designer. The design team consisted of two instructional designers in healthcare, one independent contractor and me the researcher. The independent instructional design contractor has a vast amount of experience working on healthcare instruction at another organization. A nurse educator from each site had been selected and was endorsed by their immediate supervisor. The two educators from both participating hospitals provided their

letters of support agreeing to be the resource people in assisting me throughout the study and to help identify the most appropriate participants for the study.

A rapid response nurse with emergency room expertise is an educator from an affiliating hospital that provided a letter of support, volunteering his time, outside of his scheduled hours of work (Appendix E). Another nurse educator had agreed to be part of the design team as a consultant from the same affiliating hospital and provided a letter of support volunteering her time as well, outside of her work commitment. Other than the two designated educators from the participating hospitals, the members of the design team did not interact directly with any participants nor attended either study site while the research was being conducted. The site educators informed, reviewed and approved all materials designed for content and accuracy prior to the training. The design team assisted in the revisions and provided input with each iterative phase of the research design. The design team was fully committed to this research study ensuring the timeline was met. The uniqueness of this design required the participants and stakeholders to be actively involved relying on the end users perspectives, feedback and interactions with each phase so revisions could be made to the training.

Research Design

The purpose of this study was to design, implement and evaluate training intended to increase the confidence levels of nurses who needed to master the crash cart. The study used multiple methods to collect both qualitative and quantitative data and gain a better insight and richer understanding of the research problem. There were ongoing revisions with the end user in mind for each phase and group. During each training session the participants evaluated the training and provided their feedback for what worked or didn't work.

This intervention was unique in that it used a motivational instructional design model to improve the confidence level of nurses, with emphasis on mastering the crash cart. This

intervention focused more on mastering the crash cart with the intention that it would enhance the performance of a nurse during a code blue and possibly alleviate their fears and concerns. The intervention was based on my own observations as a nurse educator, feedback from the nurses who had experienced a code blue, and on an extensive literature review. This kind of research would test and possibly generate more inquiry into motivational theory and design-based research in a naturalistic context in which nurse educators often practice and teach in.

This study occurred in five phases starting out with the nurse educators and moving through each of the other four phases with the participants actively participating in the training, which lead the final instructional product. Qualitative and quantitative data was collected with each phase. The quantitative data was entered into an excel spreadsheet calculating the individual scores from the CIS and IMMS and yielding the mean and standard deviations for each participant and each group. The demographic results were entered into the excel program and statistical analysis was performed. Additionally the participants were given a five-point Likert type scale post survey to determine specifics about the training that were not addressed in the other data collection instruments.

The qualitative methods for data collection were pre-interview questions and post-survey questions that were recorded, transcribed and coded into a Word program. Findings from both qualitative and quantitative data were used identify the motivational level of the nurses in order to design effective motivationally driven training on the crash cart. Both qualitative and quantitative results were used to determine what changes were to be made to the training.

Data Collection

The following chart displays the research questions and methods used to help answer the research problem. Each instrument used in this study will be discussed in this section.

Figure 11

Research Questions and Methods

Research Questions	Collection Method	Data sources	Analysis method
Q 1. What is the current level of motivation and confidence for novice nurses using the crash cart?	CIS Survey Interview Literature review	Nurses	Qualitative analysis Quantitative descriptive statistics
Q 2. Is a mock code blue more effective than a motivational design approach in learning the crash cart?	Survey Observation Interview	Nurses	Content analysis Qualitative analysis
Q 3. Does crash cart familiarity increase as a result of motivational training?	Survey Observation	Nurses	Content analysis Quantitative descriptive statistics Qualitative analysis
Q 4. To what extent does the ARCS motivation design impact nurse confidence about the crash cart?	IMMS CIS	Nurses	Quantitative Descriptive Statistics
Q 5. Does the iterative process of this designed-based research improve the outcomes for learning the crash cart?	Survey Observation Journal	Nurses Educators	Content analysis Qualitative analysis

I provided a demographic survey for the participants so I could gain better understanding and description of the audience prior to each training session. Obtaining audience information is part of the motivational design process (Keller, 2010). By identifying the entry level of the nurse and experience helped to inform me of current or prior knowledge or skills that the participant had. I was aware that the novice nurse would not have much experience and may have difficulty in connecting the contents of the crash cart with the process of a code blue. The questions were designed so that I could ascertain if the participants were novice to beginner nurses and to determine if they had previous training or exposure to the crash cart and or code blue.

Figure 12

Demographic survey

Demographic Survey	Rationale
1. How many months or years have you worked as an RN?	Determine eligibility to participate in study
2. Please select the level of nursing education you have obtained: Diploma Associates BSN MSN Other	Nursing programs very in duration. Determine entry level.
3. Please circle your present employment status? Full time Part time Contingent	Likelihood of future exposures to code blue
4. How many times have you participated in the past in a code blue? _____	Determine if nurse is a novice
5. I am confident in participating in a code blue? Select one. Strongly agree Agree Undecided Disagree Strongly disagree	Determine confidence
6. Since receiving your nursing license has anyone ever reviewed the crash cart contents before? Yes No	Determine the extent of exposure
7. When was the last time you reviewed the contents of a Crash Cart? Select one. Never In school In the workplace	Determine training

At the beginning of each training session, three open-ended questions were asked of the participants to engage them and prepare them for the training by gaining their interest. The questions were designed in alignment with ARCS to inform me of the participant's perceptions or attitudes toward the crash cart. Each participant was recorded as they responded to the questions. I wanted to determine if there were any immediate concerns or fears prior to the training that I had not anticipated thus making revisions, if needed, during the training. All participants' responses were transcribed and entered into a Word document, coded and analyzed. I informed the participants that I might contact them if I had to conduct a member's check to ensure accuracy or if I needed any clarifications to the data collected.

Figure 13

Pre-Interview Questions

Question	Criteria
1. What is your biggest fear or concern in participating in a code blue?	Confidence Satisfaction
2. Can you describe the role of a nurse in a code blue?	Relevance
3. Is there one part of the crash cart you are more concerned with?	Attention

Course Interest Survey and Instructional Materials Motivation Survey

This study utilized two ARCS-based measures of motivational tools in conjunction with the ARCS model. The first survey called the Course Interest Survey (CIS) measured the participant's reactions to instructor-led training given to all participants in the study. The CIS (Keller, 2010) consists of 34 questions formatted as a Likert-type scale, which should take approximately 10 minutes for participants to complete. This survey was given at the end of the training session to determine participant's reactions and motivation with respect to the instructor-led training. The survey is a situation-specific measure of motivation, therefore a normal distribution of responses are not expected. Participants were asked to respond to each question as it related to the course they participated in indicating how true the statements were. The response scale ranges from 1 (not true) to 5 (very true) for each item. There were four subscales that could be used and scored independently, or all scores can be totaled together. The minimum score on the survey was 34, and the maximum score 170 with a midpoint of 102. Subscale scores varied because they did not have the same number of items. There were nine response items require the scores be reversed before they could be totaled.

1	2	3	7 (reverse)
4 (reverse	5	6 (reverse)	12
10	8 (reverse)	9	14
15	13	11 (reverse)	16
21	20	17 (reverse)	18
24	22	27	19
26 (reverse)	23	30	31(reverse)
29	25 (reverse)	34	32
	28		33

Table 1

Scoring Guide for CIS

Table 2

CIS Reliability Estimate

Scale	**Reliability Estimate(Cronbach's α)**
Attention	0.84
Relevance	0.84
Confidence	0.81
Satisfaction	0.88
Total	0.95

The second survey was the Instruction Materials Motivation Survey (IMMS). It was designed to measure reactions to the instructional materials designed for the training. The IMMS survey was administered one time to the hospital D & H educators. The IMMS (Keller, 2010) survey consists of 36 statements in relation to instructional materials used in this research. The 36 questions were slightly revised to fit the proposed research. As in the CIS, the IMMS survey was divided into four subscales that can be scored independently or in totality. The IMMS is formatted in a Likert-type scale similar to the CIS.

There are ten items that require response scores to be reversed prior to summing up the scores. The minimum score on the survey is 36, with the maximum score 180 and a midpoint of 108. Both surveys have been slightly adapted to fit the purpose of the study regarding terminology or tenses; however not the substance of the items. The CIS (Appendix F) and the

IMMS (Appendix G) survey have been validated through various studies and internal consistency determined using Crobach's alpha (Keller, 2010).

Table 3

IMMS Scoring Guide

A	**R**	**C**	**S**
2	6	1	5
8	9	3(reverse)	14
11	10	4	21
12 (reverse)	16	7 (reverse)	27
15(reverse)	18	13	32
17	23	19 (reverse)	36
22 (reverse)	26 (reverse)	34 (reverse)	
24	30	35	
28	33		
29 (reverse)			
31 (reverse)			

Table 4

IMMS Reliability Estimate

Scale	**Reliability Estimate(Cronbach's α)**
Attention	0.89
Relevance	0.81
Confidence	0.90
Satisfaction	0.92
Total	0.96

Summary of Post Survey Questions

At the end of the training I included a five-point Likert-type scale survey consisting of five questions to glean additional information that I did not feel was obtained from the CIS instrument. I asked questions that were more specific to the overall training. After the first training session I realized that I wanted additional information as it related specifically to the training, but the time constraints did not allow me to do an informal interview at the end of the training. I felt it would be more convenient for the nurses to provide additional feedback via a quick survey included with the CIS at the end of the training. The information was entered into a

Excel spreadsheet for analysis. The information was used to make further revisions to the instruction for the next group of nurses.

Figure 14

Post Survey questions

1. Did the training increase your confidence in identifying and accessing the items in the crash cart? Strongly Agree Agree Neutral Disagree Strongly Disagree	Confidence
2. Do you feel prepared to participate in a code blue as a result of the training? Strongly Agree Agree Neutral Disagree Strongly Disagree	Confidence Satisfaction
3. Did this training process help you identify the items in the cart needed in a code blue? Strongly Agree Agree Neutral Disagree Strongly Disagree	Attention Design
4. Are the labels on the crash cart drawers helpful in locating the items? Strongly Agree Agree Neutral Disagree Strongly Disagree	Design
5. Learning the crash cart contents will improve my performance during a code blue. Strongly Agree Agree Neutral Disagree Strongly Disagree	Relevance Satisfaction Perception

At the end of the training I asked the participants in each group if the training was helpful to them? Additionally I asked them for any suggestions they could offer to improve the instruction for the next group. All information was recorded and transcribed into a Word document, while looking for common themes or suggestions to inform me of further revisions needed to the instruction.

Researcher Journal

I kept a journal that was used as a reflective tool, as an organizer of information and to inform me of the progression of the study. I made ongoing entries into the journal when meetings occurred with the educators or the design team and, with each iterative cycle, or anytime a milestone was reached (Appendix H). The journal helped me to identify barriers, and challenges that occurred during the research process. Journaling enabled me to recount in detail the process of the study, and what worked, and what did not work. Throughout the study my entries enabled me to reflect and analyze various situations so I could generate ideas or make additional improvements. I maintained these notes as the researcher, to reflect my initial thoughts, allowing for comparisons and connections to be documented to generate further ideas and revisions.

Data Analysis

All of the interviews, observations, and memos were transcribed and categorized by me and in a Word document to organize the data, accommodate coding processes, and facilitate additional analysis. This allowed me to identify any emerging themes, concerns or needs, allowed for revisions prior to entering the next design phase. I reviewed the taped recordings and transcripts ensuring accuracy while comparing the data from each cycle looking for common themes and categories. Any transcriptions obtained through audio recordings were validated independently by another design team member to ensure accuracy prior to moving to the next phase.

As the data was analyzed, a process of coding and identifying categories was supported through the use of journaling. Coding qualitative data requires storing and summarizing information with 1) descriptive coding, 2) topic coding, and 3) analytic coding (Richards, 2005).

There were three reviewers analyzing the information for accuracy thus avoiding any biases and increasing the scientific rigor. I was the first reviewer and coder of the information. A

second qualitative researcher, a graduate research assistant, reviewed all transcripts, coding of information and looked for common themes within the data collected. The second reviewer conducted their analysis identifying themes, coding the information and then comparing it to the analysis and interpretations of the first reviewer. A third major qualitative reviewer, my research committee chair advisor, was available to resolve any conflicts if any arose between both the first and second reviewers.

There were at least three iterations to this design-based study that resulted in the final crash cart training. As the study progressed through each new phase, revisions were made prior to the training for the next group of five nurses. The intervals between each phase were approximately four weeks apart. Each time the design team got together we reflected and responded to the results by asking the following key questions.

1. What conclusions can we draw about the participant's learning?
2. Why did we get these results?
3. How well did the motivational strategies align with increasing the nurse confidence in learning the crash cart?
4. How do we build on what we have developed? How might we strengthen the instruction for the next cycle?

Phase One

The initial phase of this design-based research study included an extensive literature review on learning and motivational theories, on instructional design and on crash cart training. Prior to conducting the research, a description of the study was sent to the directors of education at each of the participating hospitals for their review and for which they received approval from their perspective Chief Nursing Officers. Letters of support from the educators, the directors of

education and the approval of the chief nursing officers from each hospital were subsequently provided to me (Appendix I, J).

Once letters of support from each hospital were obtained, an application outlining the proposed study was submitted to the organization's Nursing Research Council for their review and their approval prior to conducting the study. The Nursing Research Council provided their approval letter including their feedback and conditions for conducting research within their facilities (Appendix C). Additionally another application to the hospital's Research Review Board also had to be submitted in order to proceed. Approval was granted through the research hospital committee and Wayne State University Institutional Review Board (IRB). After I received all necessary approvals I contacted the educators to arrange a meeting. I then met with the directors of education and the educators in the months of February and March of 2014 to review the purpose, goals and the timeline for this study.

Design-based research did not allow for me to fully develop materials until the actual research was under way. Through the initial data collection and fact finding with educators I consulted with the design team. I started to design the instructional materials and training based on the needs of the organization and the participants. A prototype of instruction was developed based on the Layers of Negotiation model and Keller's motivational strategies as a systematic approach for designing materials for the crash cart.

Materials created included: a booklet describing the roles and steps in a code blue and included detailed pictures of the crash cart contents and interactive training sessions. The booklet was designed to capture the attention of the reader by having a picture of a crash cart on the front of it and titled 'CRASH CART CRASH COURSE'. I had spent several hours photographing all the contents of the crash cart at hospital D. Much time was spent in getting the best quality pictures for the booklet. My goal was to have as much detail as possible for the participants when

referencing the cart. Pictures inside were very detailed and in color to capture the learners interest. Content was sequentially based on the process of a code blue. This booklet was given to each participant at the beginning of each training session.

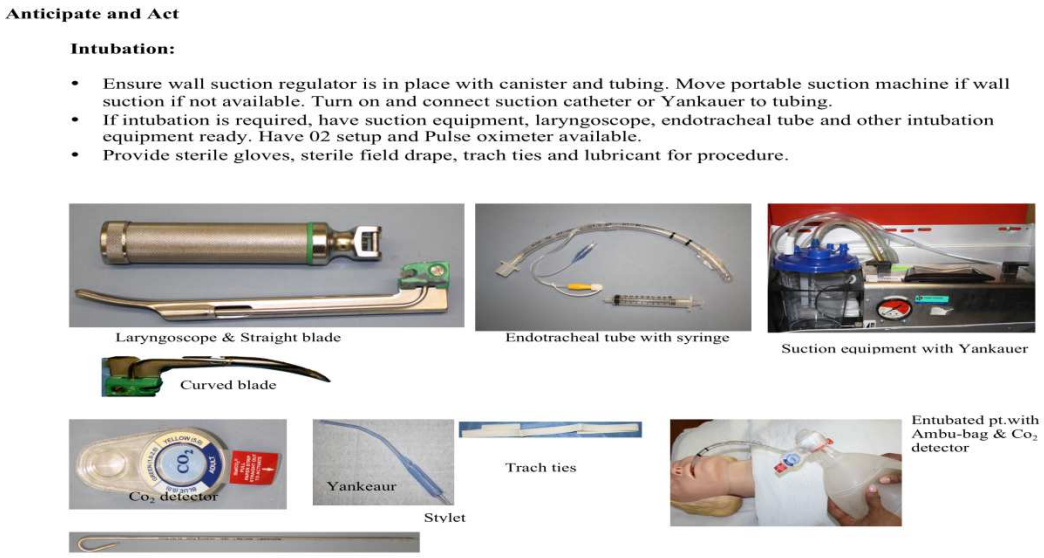
Figure 15

Booklet cover page

The key strategy from a design point was to chunk the information through use of graphics and text, so the learner could have a visual of what is required during a code blue. Often nurses use this method of anticipation for learning other procedures, for example starting intravenous. Likewise, I wanted them to use this same process for anticipating items needed in a code blue. Because most learners do not see the crash cart contents frequently, I felt that providing them with detailed pictures of the cart contents would help build their schema. I wanted the learner to anticipate and act on what would be requested of them during a code blue. For example, when a patient requires intubation, I wanted the learner to anticipate what items would be required for that procedure and retrieve them from the crash cart.

Figure 16

Example booklet content



This strategy gave a quick visual and reference for the learner to get a mental picture on what was needed in a code blue thus allowing them to reference the booklet at any time. Many of the items contained in the crash cart the novice nurse may or may not be familiar with. Additionally there was a complete pictorial in the back of the booklet that included all five drawers of the crash cart with detailed labeling of the contents. I used this design strategy in keeping with Keller's ARCS design principles. The goal of this booklet was to provide the learner with a reference to rehearse and familiarize themselves with the cart contents after the training. This would also help learners to feel more confident and less fearful, by being informed of what the contents of a crash cart looks like and where to find the items.

Figure 17

Example of crash cart drawer

I met with the educators and the director of education at both participating sites later in March 2014. I wanted the educators to understand the objectives for the study and have confidence that I would be in alignment with their own organization's objectives. I felt it necessary to keep them informed with each step of the process since I was a guest in their organization. This strategy was helpful in building a sense of trust with the educators as they allowed me liberal access to their crash cart and classroom while I was conducting the study. I was entrusted with their new nurses so I realized I would have to have a good working relationship and communication with the group of educators so I could be successful in completing the study.

The educators reviewed the materials in the booklet for accuracy and content. I sat down with the group and each page of the booklet was examined for its content and clarity. The

director of education from the hospital D really liked the detail in the pictures. The following suggestions were made to the booklet ensuring that emergency numbers coincided with each hospital, and making some slight revisions to chart that described the roles and responsibility of persons involved in a code blue in their organization.

The three educators were asked review the final crash cart booklet and evaluate it using the Instructional Materials Motivation Survey (IMMS). The course contents of the booklet were reviewed and approved by the nurse educators from each site, to ensure accuracy and appropriateness for the training. I entered their responses into a database and assigned coding to each educator as A, B, and C when entering the data to maintain anonymity. The results are reported in the results section. Through discussion with the design team and with the results from the IMMS it was decided to make changes to the design layout so the information would be spaced out on each page for the ease of reading. There was too much information appearing on each page, therefore adjustments were made.

Further revisions were made to the design of the booklet after consulting with the design team prior to the first training. The budget did not allow for the educators to print materials in color for the participants. I was responsible to provide the booklets for each participant in each session. With nurse educators we decided it would be better to train the participants on the defibrillator and documentation at a later date, given the allotted time constraints. Hospital D provided me with a date for the first group of participants however, this was contingent on whether there were any new employees at the time, since it was decided we would recruit from this group for convenience sake.

Phase Two (first iteration)

I was contacted by the educator, to conduct the training on the second day of the hospital orientation with possibly four or five participants in the month of April 23, 2013. In the first

iteration of the design the instruction was provided to a group of four novice nurses at hospital D. This group will be referred to as 1D. The allotted time was one hour to one and half hours for the training and feedback. I was invited by the educator the day before to come in and introduce myself and obtain consents to save some time. On the day of the training I did not have a script to follow, however I introduced myself and gave a little background on my work experience. I made it clear that their involvement was strictly on a volunteer basis. I described and explained the research, then obtained informed consents from the participants. I collected their email addresses and phone numbers in case I needed to contact them for any reason. Their information was later stored in a locked file in my personal office. I explained I would be recording the session and that all information would be held in strict confidence. I provided each participant with a booklet. I asked the participants to review the content overnight, so they would be familiar with the contents. The day of the training and prior to the training the group was given a survey to obtain demographic information. This was helpful because it helped to inform me about the audience in case any revisions needed to occur during the instruction.

The day of the training I arrived early to set up the room and to touch base with the educator. I set up the equipment and reviewed my outline of how the training would proceed. I noticed the educator took great pride in her crash cart and training room being very organized. Before the training I asked the participants three pre-interview questions. I went around the room asking each participant the questions allowing for each of their individual responses, which were being recorded. My rationale for this was to determine if there were any additional fears or concerns regarding the crash cart, the code blue, and their confidence level. I used this strategy to get their attention by getting them engaged in dialogue about their concerns or fears, and this led into the brief discussion about the significance and relevance of the training.

I reviewed the booklet with them, reviewing each page and reinforcing certain concepts. I gave examples how chunking and anticipating a procedure would help in building their confidence in the crash cart. I explained how developing a mental picture and rehearsing would help them to recall what was needed during a code blue. Once we reviewed the booklet we moved onto the hands-on part of the crash cart training.

I had developed a mock-up version of the drug drawer in Power Point to introduce the drugs in the cart. The slide had a picture of the drawer and its contents with roll over-buttons that would activate another slide to appear and provide a drug with a doctor's order typically seen in a code blue with feedback provided.

Figure 18

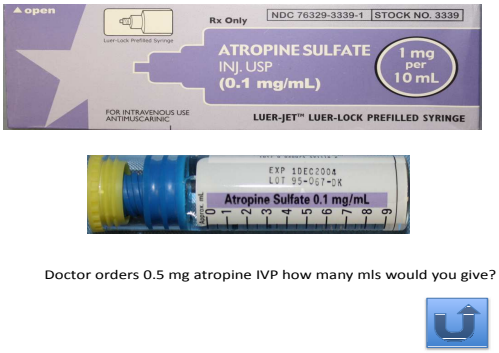
Crash cart drug drawer

For example by clicking on one of the drugs from the drug drawer, a new slide would appear with a doctor's order (Figure 19). When the return arrow was selected the drug drawer slide would reappear allowing for the participant to select another drug. This strategy was developed in hopes of providing the end users with time to rehearse and reinforce their familiarity with the contents of the drug drawer thus building their confidence. My intention was

to develop this fully with all contents of the crash cart for this study. I had envisioned that this could eventually be uploaded to the hospital learning system. Time constraints did not allow for this, however I did develop the drug drawer prototype for this training.

Figure 19

Example of drug



I reviewed this prototype drug drawer with the participants in the group to introduce the common code drugs. I used my laptop computer to demonstrate this program, which did not engage them fully. I could see by their facial expressions that they did not find it helpful that I was controlling the program. I told them this was a mock-up program and asked if this would be helpful to them if it were made available to them. Overwhelmingly, participants felt this was a very useful strategy and that would be helpful for them to review the crash cart contents on their own. However, they also reported that they needed hands-on training with the drugs and not just one method of training.

The next part of the training was to show learners the contents of the cart, one drawer at a time. I would pull out each item one at a time, naming it, describing its use, and how to assemble the item if necessary. I thought this strategy was useful to save time and I felt learners did not know what the item was used for. After I went through each drawer I had the participants randomly pull items from the drawer and state what it was and its purpose. With respect to some

of the items, the participants had no idea about its use or assembly. I had the nurses assemble some of the drug syringes called Bristol jets, which requires a bit of practice (Figure 20). Additionally, because they were novice nurses, they did not have the experience in certain procedures such as, blood gases or starting intravenous. Therefore, they were at the disadvantage of not having the previous experience to make connections to some of the information, and this made it more difficult for them. Each nurse had an opportunity to assemble the laryngoscope (Figure 21).

Figure 20

Bristol jets

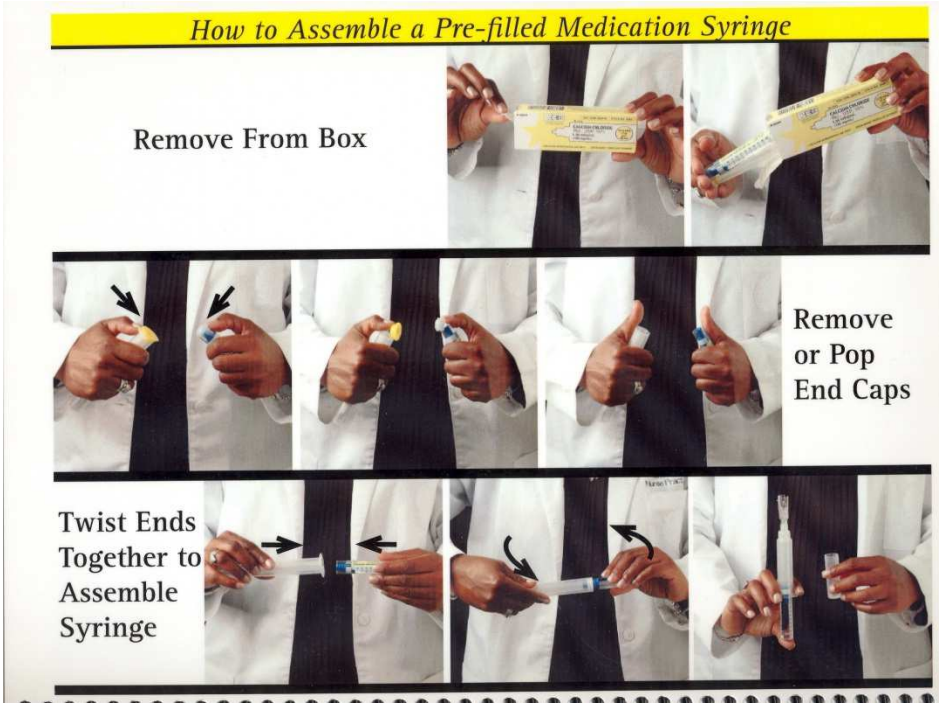
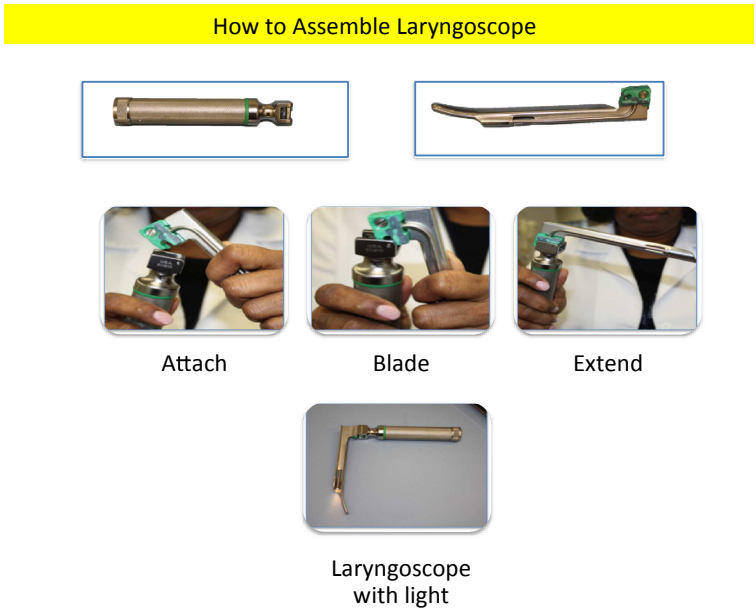


Figure 21

Assemble Laryngoscope



When the training was completed the participants were asked to evaluate the training using Keller's CIS survey that was designed to measure the participant's reactions to the instruction. Additionally participants were asked if there were any other changes they would like to see in the instruction. Using the Layers of Negotiation the designer and the participants collaborated on potential changes to the materials using social negotiations to evaluate the instruction from multiple perspectives (Cennamo et al., 1996). The emphasis was on client-centered design, and this approach provided an opportunity for the end users (nurses) to provide input into the training. The participants had the opportunity to construct their own ideas and generate some possible changes that would be presented to the design team during the revision process.

Results from the CIS, interview questions, and my observations were documented, and analyzed prior to meeting with the design team. The group was assigned the name Group 1D which the letter represented the hospital and number indicated the order in which the group

appeared in the study. Each participant was assigned a code within their group to maintain their anonymity for example; the members were identified as 1a, 1b, 1c, 1d. This method of coding continued throughout the study. Responses were recorded and transcribed into the database. Educators at both hospitals informed me of when the next available date for the next phase of training would occur.

I met with the design team once all the data was entered and analyzed by me which was approximately 2 weeks later. I realized that there was too much content for such a small amount of time and that I had to scale the instruction down to one hour, if possible, and use the additional half hour to do paper work and interview questions. Based on the feedback from the CIS, I had to make some adjustments to the training, especially in the Attention subscale of the ARCS model. The participants made it clear that I had failed to keep their attention. Revisions were made to the instruction to engage participants more. It was decided that with the next group of nurses the training would have more hands-on with the crash cart and less time with interview questions.

The design team discussed ways that could engage the nurses more with the crash cart. It was decided to have the participants empty out the crash cart one item at a time and state what it was and its purpose. The participants would also be given a card that had a task on it that they must do. Additionally, I decided to put color tags on the drawers of the cart to see if this would help in retrieving items from the cart when given the card with the task.

It was also decided to insert five post survey questions at the end of the CIS survey. This was to save time if I could get additional information specifically as it related to the training that I felt the CIS might not provide, thus reducing post-interview questions down to two. Finally I developed a specific agenda to keep me on track so as not to run out of time.

Phase Three (second iteration)

With the second iteration the revised instruction and training occurred with the next group of novice nurses at both hospitals D and H four weeks after the first group. These two groups will be referred to as 2D and 2H. The educator at hospital H informed me at the beginning of May 2014, that there was a group of novice nurses available to me, provided that they consent to be part of the study. I would be training them during a scheduled time that was arranged by the educator. These nurses were currently working and part of a support program referred to as a *nurse residency class*.

One week later the educator at hospital D informed me that she had a group of nurses for the study. I accepted this opportunity knowing that I may not come across another group of novice nurses until the next hospital D orientation. The educator provided me access to these nurses, and I understood that I was committed to take the group of nurses if they were available during their orientation. I was unable to give the booklets to the participants prior to the training since I did not have access to any of them until the actual day of training. I anticipated that it would take more time to review the booklet with the participants, since they did not receive the information prior to the training.

Prior to the training I arranged to meet with the educator at hospital H two weeks earlier to arrange where the training would take place and to insure the crash cart was organized. Unlike hospital D, the crash cart at hospital H was very outdated. Several items were missing and many of the code drugs were outdated and no longer used in code blues. My immediate thoughts were how could an educator feel good about the instruction they were providing using such an outdated cart as I reflected in my journal (Appendix H). The educator at this site was new in her role and appeared indifferent regarding the condition of the cart.

I contacted the director of education from the hospital H to see if there was any way to replace the cart with a more updated version. This was met with much resistance with the educators at this site. My initial thoughts as an educator were, “this training would not be conducive to positive learning experience for the participants if the cart was in such disarray” (Appendix H, Line 81). The director of education at hospital H directed me to organize the cart to the best of my abilities and not to contact any educators as they were trying to get a replacement cart. I refrained from making this an issue knowing that I was a guest in this hospital and I did not want to create any problems so I just complied. This was very stressful, as I knew the instruction would not be as effective if the old cart was to be used.

The day of the training I still didn’t know what to expect in terms of the condition of the crash cart I would be using. As I entered the room the same old crash cart was there and I resigned myself to do the best training with the outdated cart. I had feelings of embarrassment over the condition of the cart and resigned myself to do the best I could in this setting (Appendix H, Line 80). I set up the room in advance and added color tags to the crash cart as another strategy to assist the nurses in finding the items in the cart. The group size consisted of five novice nurses.

I proceeded the same way as in the first training with the previous group, giving some background information about myself and about the study. After the introduction I provided all the paper work and I obtained all their consents. I had an additional constraint with this group, as they only had exactly one hour to spare because they had to catch a shuttle to another class. I gave all the participants the booklets, paper work and all surveys to be completed to save time. I queried the participants with the same pre-interview questions and recorded their responses. I had to move along quickly, methodically focusing on the training that did not allow for too much discussion or distraction. One by one they answered the questions. I then quickly reviewed contents of the booklet with them and trying not to appear rushed even though I was. I

highlighted key areas in the booklet and stressed the importance of developing a mental picture of items needed in an emergency situation. Reviewing the booklet was a bit disconcerting, because the pictures did not coincide with the outdated crash cart. I reassured the participants the pictures in the booklet were similar to the crash carts that were stocked in their work areas. I knew the cart did not even look like the ones the participants already had seen while working.

This group was different from the previous one because they had received some training with the crash cart initially in their orientation. They were still novices, however some had experienced a code blue while working. I had the nurses gather around the cart, and I pulled one item at a time from the first drawer and stated what it was and its use. I knew the participants were frustrated with the cart because some of the items were missing or broken. I did this until the drawer was emptied and then moved to the next drawer.

The only drawer we did not empty was the medication drawer, which was saved for later. Once items were returned to the drawers the nurses were given a card with a task and asked to pull items related to the task. The drawers were color-coded coinciding with the back of the task card. The card provided more detail on the items needed for the task and the color-coding helped the nurses find the items in the cart. Figure 22 depicts the sample of the cards and the color-coding. The front of the card stated the task and had colors on the front matching the drawer in which the nurse could find items for that task. If they could not remember what was needed they could turn over the card and the items were listed on the color-coded labels matching the drawer. This made it easier for them to locate the items. This strategy was not as effective with this group given some of the items were missing from the cart. The group was also encouraged to help each other if they got stuck in finding the items.

Figure 22

Example of colored coded cards

Example of color coded cards and color coded drawers on the crash cart for training

Each participant was given an opportunity to do a task. I then moved on to the drug drawer and gave them a pink card that had a drug name and dose ordered. The participant was expected to find the drug in the drawer and assemble a syringe. I did not have time to show them the drug drawer Power Point program to see if this strategy would be something they would find useful. The training felt rushed as the participants had to complete the survey questions at the end of the training. I had asked the final post interview questions and recorded their responses.

The participants stated that they liked the training because the other training they received was done in too large of a group, and they felt they could not get any hands-on experience. Another comment was that they wished the training could be longer. They also commented on how the cart was old and did not have the items in it. I had anticipated this was going to be something the participants would be dissatisfied with. I acknowledge their feelings and apologized for the condition of the cart.

I collected all data and entered it into the spreadsheets. This group was labeled as 2H and the participants once again were assigned codes 2a, 2b, 2c, 2d and 2e to their paper work. The very next day I had to do another training at hospital D with new group. After consulting with

my design team, the decision was made not to make any revisions to the training with hospital D group. Time constraints would not allow for any revisions to be made unless they were real evident ones. I felt it was imperative to send a thank you email to the director of education acknowledging how helpful the educators were, so I could maintain a good working relationship with them.

The next day I trained the second group of five nurses at hospital D. I followed the same instructional strategies however here there wasn't such time constraints as at the other hospital. Once again I could not distribute the booklets ahead of time since I did not have access to the nurses until the training. Prior to the training I prepared the room and labeled the cart with colored labels. The educator did not want the medications disturbed on the cart, so she provided me with a box of used ones for assembly.

I proceeded with the training in the same format following an agenda that I had developed to keep me on track. This time I had the nurses retrieve items from each of the drawers, instead of me doing it for them. I directed the nurses to start with the first drawer and then work downward one drawer at a time. I could tell by their expressions they were engaged as they were smiling and trying to recall what the item was. When they were required to assemble an item, for example the laryngoscope, I assembled it for them first then we passed it around to each individual so they could assemble it. Their actions demonstrated that they understood what was required of them. They emptied out each of the drawers excluding the medication drawer, which we did separately.

I demonstrated first how to assemble the medications and reinforced the importance of reading the medication labels and confirming the doctor's orders along with their drug calculations. I reviewed some of the common drugs in the drawer since there were too many to address in the training. I highlighted key points and demonstrated how to assemble some of the

syringes. Once we reviewed the drug drawer I handed out a task card randomly to each participant. They were asked to retrieve the items for that task on the card. They were able to find the items using the information on the back of the cards as needed. The color-coding on the drawers assisted them in locating the items if they were stuck, or they could use the additional help of their co-workers in the group. I continued allowing them to do as many hands on activity as time permitted.

Once I felt each participant had an opportunity to do one crash cart task card and one medication task card, we moved on to completing the surveys. At the end of the session I had asked the group additional interview questions, which were recorded. The participants expressed they liked the training, however they felt the training was offered too early into their employment (Appendix K). They also stated they needed more time and that it would be nice to have a mock code blue for follow up. They felt they did not have knowledge for some of the required skills.

When the training was over I made sure to return the items to the crash cart and left it in the state in which I had received it. After the session I met with the educator from the hospital and debriefed her on the training and some of the feedback I had received. It was agreed between us that I would return in four weeks for the next group of nurses, provided there were enough people to participate during the next orientation.

Each participant from group 2D was assigned a letter as a code, so I could identify him or her. For example, 2a, 2b, 2c 2d and 2e represented the five participants. I entered all the data into my records for analysis. I met with the design team after reviewing the data collected to make additional revisions to the training. I decided to combine all feedback from both groups since they received the same training. I realized that there were some variables that were out of my control between these two groups, such as the time constraints and the conditions of the crash carts. I carefully analyzed the CIS results from each group looking for improvements in areas

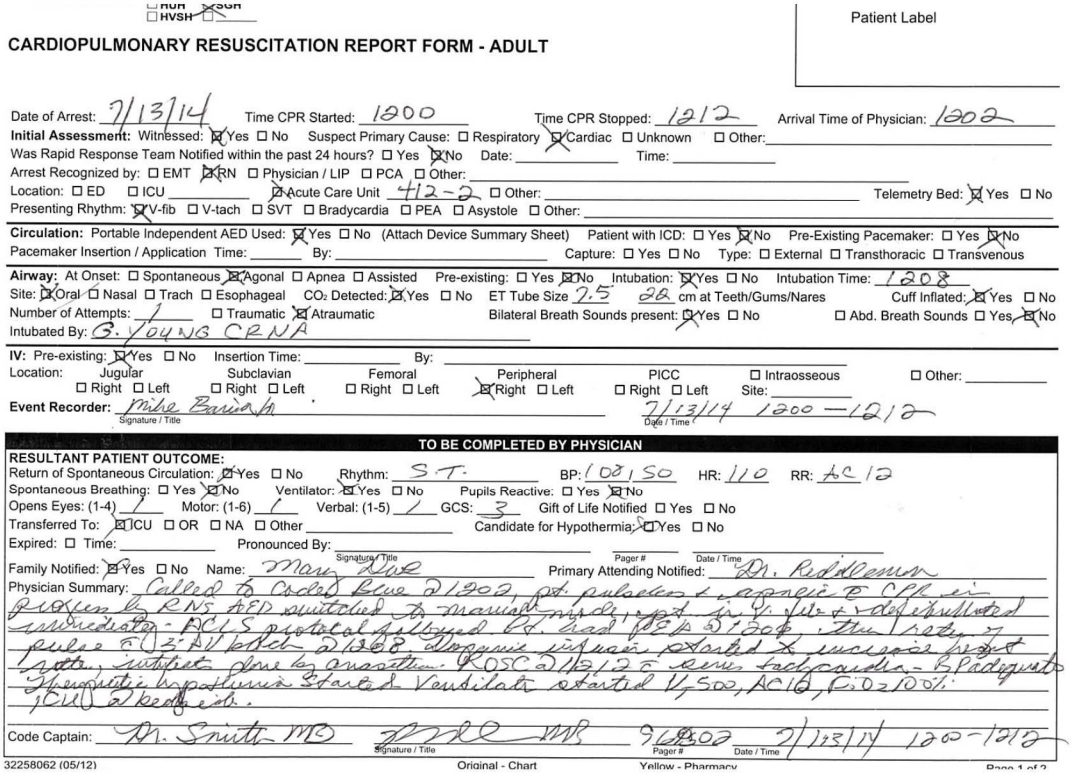
that may have scored lower in the previous group. As the second group of nurses interacted with the revised materials, more ideas and information were generated with further suggestions that would be addressed in other parts of the instruction as Cennamo et al. (1996) describes in the Layers of Negotiation.

There were not many revisions to the actual training however I did acknowledge the participants wanted a mock code blue, which we could not provide during this study. Many of the participants requested more time for the training. It was decided that it was not be feasible to offer the interactive part of the drug drawer Power Point activity because of the time constraints. It was also decided that if I could conduct the rest of the study at hospital D it would be more conducive since they were more receptive and accommodating in the study. As an educator and researcher I did not feel good about the condition of the crash cart at hospital H. However, I would have gone to any site if the opportunity arose to access participants to complete the study.

One participant suggested adding an actual code-blue record sheet that was filled out. We did add a completed sheet to the booklet after consulting with the emergency department room nurse educator on the team (Figure 23). I realized that I could not meet some of the suggestions made by the participants, such as how to set up the oxygen meter and tubing due to time constraints, though I did communicate what the participants were interested in learning to the nurse educator. All those requests were documented and given to the nurse educator at the hospital.

Figure 23

CPR Form



☐ HVSH ☐

CARDIOPULMONARY RESUSCITATION REPORT FORM - ADULT

Patient Label

Date of Arrest: 7/13/14 Time CPR Started: 1200 Time CPR Stopped: 1212 Arrival Time of Physician: 1202

Initial Assessment: Witnessed: ☒ Yes ☐ No Suspect Primary Cause: ☐ Respiratory ☒ Cardiac ☐ Unknown ☐ Other:

Was Rapid Response Team Notified within the past 24 hours? ☐ Yes ☒ No Date: Time:

Arrest Recognized by: ☐ EMT ☒ RN ☐ Physician / LIP ☐ PCA ☐ Other:

Location: ☐ ED ☐ ICU ☒ Acute Care Unit 412-2 ☐ Other: Telemetry Bed: ☒ Yes ☐ No

Presenting Rhythm: ☒ V-fib ☐ V-tach ☐ SVT ☐ Bradycardia ☐ PEA ☐ Asystole ☐ Other:

Circulation: Portable Independent AED Used: ☒ Yes ☐ No (Attach Device Summary Sheet) Patient with ICD: ☐ Yes ☒ No Pre-Existing Pacemaker: ☐ Yes ☒ No

Pacemaker Insertion / Application Time: By: Capture: ☐ Yes ☐ No Type: ☐ External ☐ Transthoracic ☐ Transvenous

Airway: At Onset: ☐ Spontaneous ☒ Agonal ☐ Apnea ☐ Assisted Pre-existing: ☐ Yes ☒ No Intubation: ☒ Yes ☐ No Intubation Time: 1208

Site: ☒ Oral ☐ Nasal ☐ Trach ☐ Esophageal CO_2 Detected: ☒ Yes ☐ No ET Tube Size 7.5 22 cm at Teeth/Gums/Nares Cuff Inflated: ☒ Yes ☐ No

Number of Attempts: 1 ☐ Traumatic ☒ Atraumatic Bilateral Breath Sounds present: ☒ Yes ☐ No ☐ Abd. Breath Sounds ☐ Yes ☒ No

Intubated By: G. YOUNG CRNA

IV: Pre-existing: ☒ Yes ☐ No Insertion Time: By:

Location: Jugular ☐ Right ☐ Left Subclavian ☐ Right ☐ Left Femoral ☐ Right ☐ Left Peripheral ☒ Right ☐ Left PICC ☐ Right ☐ Left ☐ Intraosseous Site: ☐ Other:

Event Recorder: Mike Barnhart (Signature / Title) 7/13/14 1200 – 1212 (Date / Time)

TO BE COMPLETED BY PHYSICIAN

RESULTANT PATIENT OUTCOME:

Return of Spontaneous Circulation: ☒ Yes ☐ No Rhythm: S.T. BP: 108/50 HR: 110 RR: AC 12

Spontaneous Breathing: ☐ Yes ☒ No Ventilator: ☒ Yes ☐ No Pupils Reactive: ☐ Yes ☒ No

Opens Eyes: (1-4) 1 Motor: (1-6) 1 Verbal: (1-5) 1 GCS: 3 Gift of Life Notified ☐ Yes ☐ No

Transferred To: ☒ ICU ☐ OR ☐ NA ☐ Other Candidate for Hypothermia: ☐ Yes ☐ No

Expired: ☐ Time: Pronounced By: (Signature / Title) (Pager #) (Date / Time)

Family Notified: ☒ Yes ☐ No Name: Mary Rose Primary Attending Notified: Dr. Riddleman

Physician Summary: Called to Code Blue @ 1202, pt. pulseless + apneic & CPR in progress by RNs. AED switched to manual mode + pt. is V. Fib + defibrillated immediately - ACLS protocol followed. Pt. had PEA @ 1208, then resp. & pulse @ 1212. IV bolus @ 1208, dopamine infusion started & increased prn. Intubated done by anesthesia. ROSC @ 1213 to sinus tachycardia - BP adequate. Therapeutic hypothermia started. Versidate started @ 1500, AC 16, FiO2 100%. ICU @ bedside.

Code Captain: M. Smith MD (Signature / Title) (Pager #) 7/13/14 (Date / Time) 1200-1212

32258062 (05/12) Original - Chart Yellow - Pharmacy Page 1 of 2

As the research progressed, my journal reflected in detail the experience and description of each phase, and additional insights that informed me of what might occur or what had already occurred throughout the process (Appendix H). The CIS was analyzed in each phase to help inform me of the results in each of the subscales within the ARCS survey and what areas required improvement.

Phase Four (third iteration)

The third iteration involved the forth group of nurses at hospital D in the latter month of June 2014. All revisions were made to the instruction based on the feedback provided by the previous group of nurses. This new group consisted of five novice nurses. I gave the same introduction and obtained consents and contact information as was done with the other groups. I followed the same format as I did in the previous training with group 2D and 2H. I added a completed code

blue sheet to the booklet as requested from the last group. I found the instruction format ran smoothly since this instruction had been repeated and refined with that iteration. As the educator, I could see that learners liked retrieving the items from the cart and the opportunity to assemble them. I strategically gave out cards one by one and had learners complete the tasks. We had enough time to go around the group twice and once with the drug cards. I offered them praise and provided reinforcement that they would be able to master the cart if they started to develop mental pictures of what was needed.

At the end of the training I gave the participants time to complete all the surveys. I assigned a code for this group as 3D, and each of the participants was assigned a code as follows: 3a, 3b, 3c, 3d, and 3e. Data was entered and analysis and observation continued to inform the research in the design process. The CIS survey was analyzed once again looking for areas that showed improvement or required improvement. When I queried this group about suggested changes they collectively stated they liked the training and would not change it. They also expressed the concern that they would have liked more time for this training. The hospital educators were informed that there would be one more training session, and then the study would be completed, provided the group size was sufficient. I also met with the director of education at hospital D and she expressed her satisfaction with the training. I promised her that I would supply all the files to the booklet, so the educators could use the booklet as a resource in the future.

I met with the design team to review the results of the survey. We did realize throughout the process this type of training would require more time. Although this was out of our control, I would provide that recommendation in my last meeting with the educators. We did not make any changes to the instruction, since the participants did not have any suggestions, and decided we the instruction was in its final revision.

Phase Five

The final training was conducted with the last group of nurses at hospital D during the latter part of July 2014. The final group was referred to as 4D and assigned individual codes for all nine participants as: 4a, 4b, 4c, and so on up to 4i. The nurse educator informed me one week prior to the training that there would be nine novice nurses in this group. I knew I had to take the group as a whole, given the nature of the orientation setup, and I had to follow what the needs of the organization were. The process that the educators followed was that training was offered as a group regardless of the number of participants. I knew this going in since I had worked in one of their affiliating hospitals. I printed enough materials for the participants. I was concerned with the number in the group knowing that it would be challenging to give them all a chance to retrieve items from the cart more than once.

My approach was to stay in the classroom with the participants for the introduction and during completion of the required paperwork. I continued with the same format as with the previous group while recording their responses, which obviously took more time. We spent a bit more time reviewing the contents of the booklet. I anticipated this would happen because of the larger group size. They wanted to share more on what their experiences were with the crash cart and code blue. I could tell the nurses were engaged as Keller suggests learners will be when information is relevant and learner attention is captured, thus more motivated to learn (Keller, 2010).

We then moved to the training room, which took time to set up because of the number of participants. I tried to create enough space around the crash cart for their viewing. I had them retrieve the items from the cart. I was careful to ensure that no one was left out. If I noticed someone moving outside of the viewing area of the cart, I drew him or her in by giving the next task to him or her. I could only allow them to do one task card each due to the time constraints.

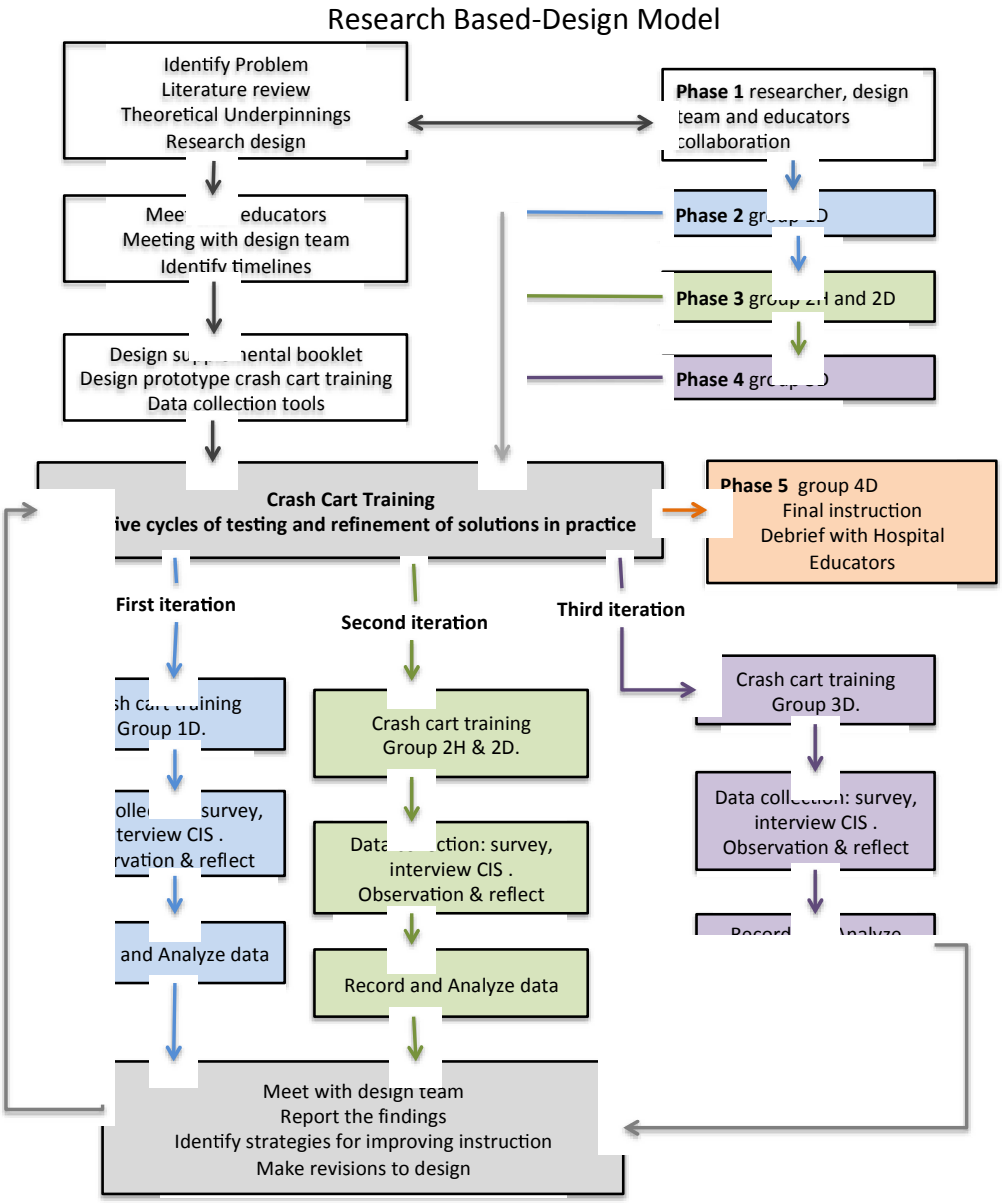
Instruction became more challenging when it came to the medication drawer. Not all were given the opportunity to do a medication task although they did get an opportunity to assemble a Bristol jet syringe that required a bit of instruction.

When we ran out of time, the nurse educator informed the group that she would review the medication drawer with them later during the orientation. I administered all the surveys and collected the information. I asked if there were any changes to the instruction they would like to see made and they all stated they liked it the way it was.

The data was collected the same way as with all the other phases. I met with the educators and the director of education for a debriefing regarding the outcomes and what strategies were used in the training. All printed materials used in the training were given to the educators along with a commitment by the researcher to inform them of the results of the study. I personally thanked all the educators for all of their support. The purpose of the study was to design, implement and evaluate educational materials and training in order to increase the confidence levels of nurses attempting to master the crash cart. The study used multiple methods to collect both qualitative and quantitative data in order to gain a better insight and richer understanding of the research problem. Figure 24 depicts the process of this design-based research and of the phases.

Figure 24

Overview of Crash Cart Design



In keeping with the chosen design principles, Keller's motivational design strategies were used throughout the research process. The strategies used in this study for gaining the attention, showing relevance, increasing confidence and increasing satisfaction with the instruction have

been summarized in Figure 25. Keller suggests getting the participants attention using strategies such as: a case study or scenario, and demonstrating how relevant the training is to their practice by using real-world problems related to their own nursing practice (Keller, 2010). Feedback was provided to increase learner's confidence as novice nurses and to provide a sense of satisfaction as they learned to master the crash cart.

Figure 25

Summary of strategies

Subscale	Strategies
Attention	• Asked questions about their fears and concerns. This stimulates their curiosity • Provide examples of code blue situations • Used eye catching colored graphics • Title captured their attention "crash cart crash course" booklet • Formatting booklet by creating white space, variations to the layout using color and bolding text and sequencing the information in a logical way.
Relevance	• Provide examples how knowing the crash cart will improve their confidence and proficiency. • Demonstrated how to assemble items. • Linking what they already know to the instruction • Addressing their fears or concerns
Confidence	• Provided opportunity to practice to allow for personal achievement • Color coded cart leading to their success in finding the items • Gave feedback through praise • Provide personal attention and recognition to build confidence and show them they are valued as a contributor • Gave opportunities for the participants to give feedback to improve the instruction • Activity allowed participants to work cooperatively
Satisfaction	• Provided personal attention and reinforcement through praise • Labeled the drawers to help them be successful • Gave each participant opportunity to perform tasks thus treating them all with fair treatment • Thanking each participant for their participation and feedback

SUMMARY

The study is a mixed-methods design-based research study that attempted to design crash cart training consisting of at least three iterations for investigating the effectiveness of a motivational

design model in order to increase the confidence and satisfaction levels of nurses. The purpose of this design-based study was to see if motivational design would improve the confidence levels in nurse participants attempting to master the crash cart.

Through iterations I collected the data that I used to help determine subsequent revisions to the design. Open-ended questions provided additional insight into their fears or concerns that the nurses may have had prior to the training, so I could address these questions during the training. Demographic information provided me additional insight and understanding of the audience.

For every training session I conducted interviews, recorded observations, provided surveys and maintained my own researcher journal. The analysis of the surveys provided some indication of where improvement was needed and was supported by the conceptual structure of the ARCS model. An important feature of design-based research is that it eliminates the boundary between design and research, thus allowing for the researcher's understanding of teaching, learning, and educational systems (Edelson, 2002). After each training session the nurse educator from the hospital and I met for a debriefing on the training. Then I met with the design team to review and analyze the data collected and made the necessary revisions to the instruction for the next group of nurses.

During this study participants' motivation, attitudes and perceptions were assessed in an authentic environment that replicated the real world. The instructional design process utilized in this study was based on the Layers of Negotiation model and the ARCS model and based revisions on participants' feedback and my own observations.

CHAPTER FOUR

RESULTS

The purpose of this study was to determine the effects of motivationally design-based instruction on nurse motivation levels and crash cart training using specifically design-based research methods. The goal was to examine the process of creating instruction to meet the motivational needs of the nurses. There were twenty-eight participants who participated in the crash cart training. Three hospital nurse educators from the participating hospitals were also fully involved in the research. Qualitative and quantitative data were collected to examine the motivational levels of the nurses and to improve the crash cart training. The purpose of this chapter is to present the results. The following research questions guided this study:

Q 1. What is the current level of motivation and confidence for novice nurses using the crash cart?

Q 2. Is a mock code blue more effective than a motivational design approach to learning the crash cart?

Q 3. Does crash cart familiarity increase as a result of motivational training?

Q 4. To what extent does the ARCS motivation design impact nurse confidence regarding the crash cart?

Q 5. Does the iterative process of this designed-based research improve the outcomes for learning the crash cart?

Analysis from the data collected in each of the phases of the research revealed several overarching themes and areas for improvement. Demographic data was entered into an Excel spread sheet and categorized. Data was organized in Excel spread sheet to run descriptive statistics for the CIS and IMMS surveys. Each question from the surveys was entered into Excel the following way: 1=Not True, 2=Slightly True, 3=Moderately True, 4=Mostly True, 5=Very True. Reversed questions in the survey were entered accordingly. See CIS Table 8 and IMMS Table 10 for response scale ranges and scoring. All data was entered into Excel to determine the

mean and standard deviations for each participant, subscales and total scores. Qualitative data was entered into Word document and coded with common themes. Interviews were transcribed by me, and were validated by another design team member to ensure accuracy.

This chapter is divided into phases that discuss results from each of the iterations within the study. The following groups have been identified as 1D in the phase 2 (first iteration), the third phase (second iteration) group 2H and 2D, the fourth phase (third iteration) group 3D, and phase five (final instruction) group 4D. All of the training took place in the same designated area provided by the educators in both of the hospitals.

Demographics

At the beginning of each training session, all 28 participants were asked to fill out a demographic eight-question survey. The following responses from the participants were entered into an Excel spread sheet and analyzed using descriptive statistics, calculating the mean results. Nurses were asked how many months or years they had worked as an RN. Twenty-six nurses, (93%) reported less than one year of nursing experience whereas two nurses reported greater than one-year experience. Nurses were asked about their level of nursing education in which 39% (11) reported having an associate degree and 61% (17) reported having a BSN degree. Nurses were asked what their current employment status was. They reported 57%(16) fulltime, 36% (10) part-time and 7% (2) contingent positions.

Additional questions were asked specifically about the crash cart and code blues. The first question asked was, how many times had they participated in a code blue with 71% (20) nurses reporting no experience, 21.4% (6) reported less than five times and 7.4% (2) nurses reported more than five times. The next question asked if they were confident in participating in a code blue using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Nurses

reported their confidence level as: 11% (3) strongly agreed, 11% (3) that agreed, 18% (5) were undecided, 60% (17) nurses disagreed to strongly disagreeing with the statement.

Another question asked participants if anyone had ever reviewed the crash cart contents with them since becoming RNs. Based on yes or no responses, the majority of nurses, 75% (21) responded no, and 25% (7) responded yes. The final question asked participants when the last time they reviewed the contents of a crash cart. Nurses responded that 22% (6) never had, 39% (11) had in school and 39% (11) had in the workplace.

Phase One

The design team developed supplemental material to enhance the crash cart training (Appendix R). A prototype booklet, *Crash Cart Crash Course,* was developed and then reviewed by the hospital educators for content and accuracy. The educators provided their feedback and the design team made the necessary changes. Revisions to the booklet were made, and then educators were asked to complete the IMMS survey.

The response scale for the IMMS survey ranges from 1 (not true) to 5 (very true) for each item (Appendix G). The four subscales: attention, relevance, confidence and satisfaction could be scored separately and analyzed or all of the scores could be totaled and analyzed. My preferred method for interpreting the data was to determine the average score for all subscales and then calculate the total for entire survey. By to converting the totals into scores ranging from 1-5 made it was easier to compare performances (Keller, 2010).

An analysis of each subscale and total scores using descriptive statistics for each participant yielded individual and group means and standardized deviations for the 36 questions in the IMMS. The following results are listed below in Table 5 displaying the individual mean and standard deviations for each subscale. Each individual total score was calculated. Then the over-all group means and standard deviation were calculated.

Subscale A (attention) provided questions that got to the essence of whether or not the material captured the interest and attention of the learner. The subscale R (relevance) addresses how the instruction met the learners' needs. This subscale informed the design team whether or not the information could be tied to the learner's experience and whether it was meaningful to them. The content in the material must be relevant to the learner and match their goal or personal interests. The objectives in the booklet were provided in the beginning so the learner would know what to expect as an outcome.

The subscale C (confidence) questions revealed how confident the learner felt about the materials, their perceptions of self-efficacy and the types of feedback that were offered. The subscale S (satisfaction) questions focused on whether or not the materials were designed for the learners' satisfaction. This subscale provided me with some insight on how the learner felt about their own sense of accomplishment, their enjoyment and feelings of pleasure toward the crash cart booklet.

A-the attention scores ranged from 4.42 to 4.58 yielding a group mean score 4.50 (0.07).

R-the relevance scores reported mean score 5 (0.0).

C-the confidence scores ranged from 4.78 to 4.89 yielding a group mean score 4.81 (0.05).

S-the satisfaction scores ranged from 4.80 to 5 yielding a group mean score 4.93 (0.09).

The total mean score of all 36 questions for each educator ranged from 4.47 to 4.68. The group average for total scores was 4.58 (0.08).

Table 5

IMMS RESULTS

Educators	A	R	C	S	Total group M (SD)
N-3	4.50(0.07)	5(0.0)	4.81(0.05)	4.93(0.09)	4.58(0.08)

The results from the IMMS survey revealed there were some issues with the design layout. Analysis of the feedback in the attention subscale revealed that the educators felt there was too much information on many of the pages as indicated by their responses to question 31. This question had the respondents select a response to the statement, “there are so many words on each page that it is irritating”. All three educators responded with a slightly true response.

Question #24 asked educators if they learned some things that were surprising or unexpected. All educators responded not true. This impacted the results in subscale A because the educators evaluated the materials based on their own expertise and this material would not have appeared new or surprising to them. Their response to that question yielded a score of one bringing down the total score.

Question #27 asked the educators if they felt rewarded after completing the materials and the overwhelming response was, “not applicable”. The design of this booklet did not provide any feedback to the learner. This question should have been removed from the survey. Additional changes were made to the layout of the design spreading the information over more pages. In this phase of the design three nurse educators from the participating hospitals gave their final approval for the instructional materials once the revisions were made.

Phase 2 (first iteration)

In this phase there were 4 participants referred to as group 1D. The initial training lasted approximately 11/2 hours in the third week of April 2014. These participants were identified as being novice-beginner nurses. I asked the nurses three interview questions at the beginning of the training. Their responses were recorded, and then later transcribed and coded. The first question posed to the participants was, "What is your biggest fear or concern in participating in a code blue?" The participants voiced their concerns as follows: fear of not knowing what to do, fear of patient dying, fear of looking stupid, and not knowing where things are in the cart.

Each of the participants was asked if they could describe what the role of a nurse was in a code blue? The participants could not fully articulate or describe the role of the nurse in a code blue. One participant stated, "I have no idea" (Appendix K, line 13). Another stated, "to help the doctor" (Appendix K, line 14). The participants were asked, "Is there one particular part of the crash cart you are more concerned with?" The responses were, not knowing what was in it, not knowing how to use the equipment, and not knowing the process of a code blue (Appendix K). "I don't know what the medications are used for and how to give them" (Appendix K, line 19). "I have never seen the insides of the crash cart" (Appendix K, line 20).

Three of the four nurses reported having participated in a code blue in the past however when responding to the statement, I am confident in participating in a code blue in which 50% (2) responded by disagreeing and 50% (2) responded by strongly disagreeing. Three of the participants had not reviewed the crash cart contents since becoming a nurse or even in nursing school. One respondent had reviewed the crash cart contents one time in the workplace since becoming a nurse.

After the training the participants were asked to complete the CIS survey questions. The response scale for the CIS survey ranges from 1 (not true) to 5 (very true) for each item. An analysis of the subscales (ARCS) and the total scores using descriptive statistics for each

participant yielded individual and group scores means and standardized deviations for the 34 questions survey. The following results are in Table 6 and show the group mean and SD for each of the subscales ARCS for group 1D. Each of the individual responses for group 1D was scored separately and then an overall mean and SD for each group score was calculated.

A-the attention scores ranged from 2.5 to 4 yielding a group mean score 3.7 (0.79).

R-the relevance scores ranged from 3.33 to 4.33 yielding a group mean score 3.97 (0.45).

C-the confidence scores ranged from 2.25 to 4 yielding a group mean score 3.43 (0.86).

S-the satisfaction scores ranged from 2.11 to 4.33 yielding a group mean score 3.5 (0.89).

Individual scores were totaled and their total group mean was 3.85 (0.63) as shown in Table12.

Table 6

CIS RESULTS ARCS subscales for group 1D

Group	**n**	**A**	**R**	**C**	**S**
1D	4	3.7(0.79)	3.97(0.43)	3.43(0.86)	3.5 (0.89)

Upon examining group 1D data, it was very clear that the instruction had failed to capture learner attention, especially with the participant 1d, whose score was 2.5 in the attention subscale (Table 7). I analyzed all the responses in the CIS, specifically focusing on the subscale attention scores, to see why the instruction had failed this participant. Question 1, in the CIS survey asked, "The instructor knows how to make us feel enthusiastic about the subject matter of this training", the respondent selected not true. In question 4, which had reverse scoring (see Table 2) asked, "This class has very little in it that captured my attention" the respondent selected, very true. Question 10, "The instructor creates suspense building up to a point" the same participant responded not true. The last question in this subscale was question 29, "My curiosity was often

stimulated by the questions asked or the problems presented during this class" the response was not true, revealing that this participant did not feel engaged and was not satisfied with the overall training.

Table 7

Id INDIVIDUAL RESULTS

Participant	**A**	**R**	**C**	**S**
1d	2.5	3.33	2.25	2.11

Note. Individual results for all subscales for participant 1d from group 1D

Participants were then interviewed as a group for ten minutes after the training. They were asked, "Tell me what was the most useful part of the training today?" One participant stated, "I was bored" (Appendix K, line 26), and another stated, "Being able to look inside the cart and kind of knowing what you need for this and how to piece and put those things together" (Appendix K, line 30). Others stated, "I liked the hands on focus, how to piece and put together things" (Appendix K, line 32) and, "I did like that we eventually did hands on, but I would like to have more time to practice" (Appendix K, line 33). This was something the participants stated several times.

Participants were asked, "What suggestions do you have for improving this instruction?" One of the respondents stated, "I would like it if we could review the medications more" (Appendix K, line 23). Others stated, "We need more time to review the cart" (Appendix K, line 25) and, "I would like to go into the crash cart by myself or as a group to find the things in the crash cart" (Appendix K, line 34). Participants collectively expressed it would be helpful to have the training later during the orientation.

This information was entered into a word processing program identifying individuals by letter and coding their responses. I consolidated all the information into common themes such as time, practice, fears and suggestions. With this information I was able to use their feedback to make further revisions to the instruction. Through my reflections and observations I documented things that I felt hindered or enhanced the training.

I ran out of time and felt rushed to cover all the material. I observed some of the participants with arms folded as I pulled out the items from the crash cart. Some looked bewildered when I was demonstrating how to flush medication through an intravenous line. I later realized that these novice nurses did not have the knowledge to connect this information to the crash cart. They lacked knowledge in the drug drawer with the emergency drugs because of their inexperience.

After an in-depth analysis of the data collected and paying attention to what the participants had stated, I met with the design team to make the necessary changes for the next group of participants. I tried to address the individual areas in the ARCS subscale where the scores showed a deficiency. Keller suggests factors in the environment can be made to overcome boredom such as changes in the pace and approach while eye contact can establish and maintain and attention (Keller, 2010).

I removed the additional mockup supplemental material that was used in this group. I changed some of the strategies to get the participants more engaged. I decided to add a 5-point Likert scale post survey at the end of the training and limited the interview questions to only a couple at the beginning and a couple at the end of the training.

Phase 3 (second iteration)

There were two groups consisting of five participants from each of the hospitals, which will be referred to as group 2H and group 2D. It was decided that both groups should receive the same type of training in this phase of the research study. The rationale for this was there would not be enough time to analyze the data and make any revisions to the instruction between the two groups given that the training sessions took place one day apart. With this phase I included a five-question post survey to glean additional information to drive the research process. Results for group 2H will be presented first then group 2D results will follow. The combined post-survey results follow at the end of this section.

The training for Group 2H, consisting of 5 novice-beginner nurses that met the inclusion criteria, occurred on May 20, 2014. The nurse educators identified these participants and designated a time frame of one hour for the research. The participants were selected from a program referred to as, a nurse residency program. The nurse residency program provides additional support and training for novice nurses throughout their first year of employment. These nurses had completed their orientation and were currently working in their designated areas.

Participants completed their demographic surveys and all five participants had revealed they had received some type of crash-cart training during their initial orientation. They reported that they had been working for at least six months. Two of the five nurses reported having participated in a code blue in the past. However, when responding to the statement, “I am confident in participating in a code blue”, only one agreed, two responded as undecided, one disagreed and one strongly disagreed in spite of receiving code blue training during their orientation.

All five participants reported they had reviewed the crash cart contents in the workplace since becoming a nurse. At the beginning of the training I asked the nurses three interview

questions. Their responses were recorded, later transcribed and coded. The first question posed to the participants was, "What is your biggest fear or concern in participating in a code blue?" One nurse stated, "I'm afraid of it all" (Appendix K, line 54). Another stated, "I am afraid of giving the medications" (Appendix K, line 61).

Each of the participants was asked could they describe what the role of a nurse was in a code blue? Some responses follow. "To help the doctor, to do CPR" (Appendix K, line 60), "give the medications" (Appendix K, line 61), "I don't really know" (Appendix K, line 62). The participants were asked, "Is there one particular part of the crash cart you are more concerned with?" The responses were, " not knowing what to do", (Appendix K, line 65) "don't know where to find items, not recognizing the item" (Appendix K, line 66) and "the medications" (Appendix K, line 67).

After the training the participants completed the CMS survey. An analysis of each subscale and total scores using descriptive statistics for each participant yielded individual and group scores means and standardized deviations for the 34 questions in the CMS. The following results are listed below. Table 8 indicates the group mean and SD for each of the subscales for this group. Each of the individual responses was scored separately and then overall mean and SD for each group score was calculated.

A-the attention scores ranged from 2.87 to 4.5 yielding a group mean score 3.75 (SD 0.73).

R-the relevance scores ranged from 3.67 to 4.33 yielding a group mean score 4.09 (0.27).

C-the confidence scores ranged from 3.25 to 4.87 yielding a group mean score 4.45 (0.78).

S-the satisfaction scores ranged from 3.56 to 4.33 yielding a group mean score 3.8 (0.36).

Individual scores were totaled and their total group means was 4.29 (0.49) as seen Table 12.

Table 8

CIS results ARCS subscales for group 2H

Group	n	A	R	C	S
2H	5	3.75(0.73)	4.09(0.27)	4.45(0.78)	3.8(0.36)

The group was asked for suggestions regarding any of part of the training. One participant stated, "Updated crash cart would be nice." (Appendix K, line 75). Another participant felt there was not enough time to learn the crash cart. The nurses were asked what part of the training was most useful to them. It was reported that they liked the group size, because the last training they had received did not allow for full participation. One nurse stated, "I liked being able to go into the crash cart and getting the items out. I think the booklet was helpful" (Appendix K, line 69).

I included another post survey 5-point Likert survey that would give me additional information specifically how beneficial the training was. I thought this would save time rather doing an interview with the group. The survey asked participants if the training increased their confidence in identifying and accessing items from the crash, in which two agreed and three strongly agreed. Additionally they were asked if the training process helped with identifying items in the crash. All responses ranged from agreed to strongly agree. All participants believed that learning the crash cart would improve their performance during a code blue (Table 13).

Group 2D consisted of 5 novice nurses that were currently in their orientation. This group met the criteria of novice-beginner nurse and participated in the study on May 21, 2014. This group received 11/2 hours of training. Results from the demographic survey revealed that all the nurses in this group reported they had never participated in a code blue, nor had they ever reviewed the crash cart contents with anyone since becoming a RN. All five nurses reported the last time they reviewed the crash cart contents was in nursing school. When asked how many

times they have participated in a code blue, they all responded to zero times. Participants were asked to select a response to the statement, “I am confident in participating in a code blue”, where 90% (4) disagreed, and 10% (1) strongly disagreed with the statement.

The feedback and results I received from the previous group of nurses prompted me to make some changes in my training to engage this group of nurses. I decided to get the participants more actively involved by having them pull the items from the cart instead of me. I could see that the participants really liked pulling the items from the cart (Appendix H). I had the participants from hospital D remove the items from the drawers, name each item and state its use. Each participant took turns until the drawer was emptied.

An analysis of each subscale and total scores using descriptive statistics for each participant yielded individual and group scores, means, and standardized deviations for 34 questions in the CMS. The results are listed below. Table 9 indicates the group mean and SD for each of the subscales in this group. Each of the individual responses was scored separately and then overall mean and SD for each group score was calculated.

A-the attention scores ranged from 4.38 to 4.75 yielding a group mean score 4.47 (0.16).

R-the relevance scores ranged from 4.22 to 4.44 yielding a group mean score 4.33 (0.08).

C-the confidence scores ranged from 4.5 to 5 yielding a group mean score 4.72 (0.12).

S-the satisfaction scores ranged from 4 to 4.44 yielding a group mean score 4.2 (0.20).

Individual scores were totaled and a total group means was 4.71 (0.06) as shown Table 12.

Table 9

CIS results ARCS subscales for group 2D

Group	n	A	R	C	S
2D	5	4.47(0.16)	4.33(0.08)	4.72(0.12)	4.2(0.20)

The group was asked if there were any suggestions to any of part of the training they had received. One participant stated, "I like the training" (Appendix K, line 76). Another participant felt there was not enough time to learn the crash cart. The nurses were asked what part of the training was most useful to them. One nurse stated, "going into the crash cart" (Appendix K, line 72).

It was decided with this iteration, that all ten participants would be given a five-question post survey Likert scale 1(strongly agree) to 5 (strongly disagree) to glean additional information on the training. When the participants were asked did the training increase their confidence in identifying items in the crash cart, 100% (10) strongly agreed. They were asked did they feel prepared to participate in a code blue as the result of the training, 60% (6) agreed to strongly agree and 40% (4) were neutral. When asked did the training process help in identifying the items in the crash cart, 80% (8) strongly agreed and 20% (2) agreeing. The last statement asked, learning the crash cart contents will improve their performance in a code blue with 70% (7) strongly agreeing and 20% (3) agreed see Table 13.

I compared scores between both group 2D and 2H and then those scores with group 1D in this phase (see Table 10). Both group 2D and 2H scores had increased from group 1D results in all of the subscales (see Table 11). Table 10 compares both groups subscale results in which 2H scores were lower than their counter part 2D. The attention and the confidence scores were lower with group 2H, which I attribute to the outdated crash cart and the one-hour time constraint. This appears to have had an impact on the instruction and outcomes of the training.

The attention subscale contained questions that asked if the instructor did anything to create suspense or anything unusual in the training (Appendix F). For these questions participants in 2H scored lower. The subscale score for satisfaction was also slightly lower with group 2H than in 2D. The group 2H scored lower when asked did they get recognition or feedback from the instructor and did they feel pleased with the instructor's appraisal of them. This data analysis was shared with the design team and further changes to the design were made.

Table 10

CIS results group 2H and 2D

Subscales	**2H**	**2D**
A	3.75 (0.73)	4.47 (0.16)
R	4.09 (0.27)	4.43 (0.08)
C	4.45 (0.18)	4.72 (0.12)
S	3.8 (0.36)	4.20 (0.20)

Phase 4 (third iteration)

The next phase of the study occurred June 18, 2014 with group 3D consisting of five novice-beginner nurses. Minor changes were made to the instruction such as, having the participants retrieve and empty out the crash cart drawers rather than me doing it. I made a concerted effort to praise the participants more when they were able to do the task successfully and to recognize the participants by their names. The allotted time for training was 11/2 hours during their orientation. Three of the nurses reported they had not had participated in a code blue before, one reported a

one-time incident and one participant had participated multiple times in a code-blue events as a nursing assistant. However all the nurses reported not reviewing the crash cart since becoming a nurse. Two of the five nurses strongly agreed that they were confident when participating in a code blue, and one of them had multiple exposures during her previous job as a nursing assistant. When asked what was their biggest fear or concern with the crash cart, participants overwhelming reported not knowing what to do. They reported feeling stupid, not knowing where anything was in the cart, not knowing the medications and being fearful the patient may die.

The instruction followed the same format in which I reviewed the booklet with the group, had them take turns in retrieving items from the crash cart, then doing the task cards and medication cards. The instruction seemed to be seamless. Because of the improvement to the design of the instruction I had more time to spend doing hands-on with the participants. We did not run out of time for the training, although I realized I was not able to go into much depth due to time constraints. We were not able to discuss the medication drawer, however each person was able to pull out one medication and assemble it. The defibrillator that sits on top of the crash cart was not discussed, because that would have involved a separate training.

An analysis of each subscale and total scores using descriptive statistics for each participant yielded individual and group scores means and standardized deviations for the 34 questions in the CMS. The following results are listed below. Table 6 indicates the group mean and SD for each of the subscales in each group. Each of the individual responses was scored separately and then overall mean and SD for each group score was calculated.

A-the attention scores ranged from 4.38 to 5 yielding a group mean score 4.68 (0.25).

R-the relevance scores ranged from 3.89 to 4.44 yielding a group mean score 4.40 (0.06).

C-the confidence scores ranged from 3.75 to 5 yielding a group mean score 4.6 (0.60).

S-the satisfaction scores ranged from 3.33 to 4.44 yielding a group mean score 4.09 (0.46). Individual scores were totaled and a total group means was 4.69 (0.32) shown in table 12.

When the participants were asked did the training increase their confidence in identifying items in the crash cart, 100% (5) strongly agreed. They were asked did they feel prepared to participate in a code blue as the result of the training, 80% (3) strongly agreed with 20% (1) agreeing and 20% (1) disagreeing. When asked did the training process help in identifying the items in the crash cart, 80% (4) strongly agreed and 20% (1) was neutral. The last statement asked, learning the crash cart contents will improve their performance in a code blue with 100% (5) strongly agreed see Table 13.

The participants were asked was there any suggestions to any of part of the training they had received. Some suggestions were, "I would like to do a mock code blue later on" (Appendix K, line 123), "I would like to go slower", (Appendix K, line 102) "this training should happen later on in the orientation" (Appendix K, line 123). "Could you add a sample of the code blue documentation sheet filled out?" (Appendix K, line 104). The nurses were asked what part of the training was most useful to them. Some of the statements were, "I liked the way we learned to chunk the information, how to anticipate what was needed" (Appendix K, line 111), "I liked going into the drawers and getting the things out and putting them together" (Appendix K, line 114).

Phase 5 (final training)

The final training occurred on July 23, 2014 with group 4D consisting of nine participants all meeting the criteria of novice to beginner nurse. The allotted time was two hours. Nurses reported that 67% (6) had never participated in a code blue, and 33% (3) had reported at least participating in a code while in nursing school. When asked to select a response to the statement, "I am confident in participating in a code blue", 45% (4) disagreed, 22% (2) undecided, 22% (2)

agreed and 11% (1) strongly agreed. All 9(100%) nurses had not reviewed the crash cart since becoming a RN, however 45% (4) reported last reviewing the contents of a crash cart in the workplace, 45% (4) while in nursing school and 10%(1) reporting never. Nurses were asked their biggest concerns or fears related to the crash cart or code blues. Their responses were the same as the previous groups.

Based on the feedback from the previous group, no revisions were required to the instruction. I did add the completed code blue record to the booklet that was requested by the previous group. The group size was much larger for this training making it more challenging even though I had an additional half hour. The training took place in the same classroom, which made it more crowded. The amount of time that each person could actively participate was limited due to the large group size. A group of nine was too large for one crash cart. Overall, the extra time was consumed by managing the larger group. This required more time for the paper work, more time for interview questions, and more time for practice. We did not have time for each participant to do a medication task. The hospital educator informed the participants that she would provide additional training during the orientation later on.

An analysis of each subscale and total scores using descriptive statistics yielded individual scores and the group score reported as means and standardized deviations for the 34 questions in the CMS. The following results are listed below. Table 11 indicates the group mean and SD for each of the subscales in each group. Each of the individual responses was scored separately and then overall mean and SD for each group score was calculated.

A-the attention scores ranged from 3.63 to 5 yielding a group mean score 4.24 (0.52).

R-the relevance scores ranged from 3.78 to 4.44 yielding a group mean score 4.27 (0.24).

C-the confidence scores ranged from 4.13 to 5 yielding a group mean score 4.51 (0.37).

S-the satisfaction scores ranged from 3.33 to 4.44 yielding a group mean score 3.96 (0.33).

Individual scores were totaled and a total group means was 4.54 (0.22) see Table 12.

In Table 11, each subscale shows an improvement with each group of participants. Comparing the results of group 1D to group 4D in the subscale A (attention) there showed improvement from 3.7 (0.79) to 4.24 (0.52). Comparing the results of group 1D to group 4D for the subscale R (relevance) there was an improvement from 3.97 (0.43) to 4.27 (0.24). Comparing the results of group 1D to group 4D for the subscale C (confidence) there was an improvement from 3.43 (0.86) to 4.51 (0.37). Comparing the results of group 1D to group 4D for the subscale S (satisfaction) there was an improvement from 3.5 (0.89) to 3.96 (0.33). Table 12 shows group means and standard deviations across all groups. Individual scores were averaged within each group then a group mean and standard deviation was calculated. Comparing the results of group 1D to group 4D showed improvement from 3.85 (0.63) to 4.56 (0.2) as shown in Table 12.

Table 11

CIS results ARCS subscales for all groups

Group	n-28	A	R	C	S
1D	4	3.7(0.79)	3.97(0.43)	3.43(0.86)	3.5 (0.89)
2H	5	3.75(0.73)	4.09(0.27)	4.45(0.78)	3.8(0.36)
2D	5	4.47(0.16)	4.33(0.08)	4.72(0.12)	4.2(0.20)
3D	5	4.63(0.25).	4.40(0.06)	4.6(0.60)	4.09(0.46)
4D	9	4.24(0.52)	4.27(0.24)	4.51(0.37)	3.96(0.33)

Table 12

CIS group totals

Groups	1D	2H	2D	3D	4D
N	4	5	5	5	9
M	3.85	4.29	4.71	4.69	4.54
SD	0.63	0.49	0.06	0.32	0.22

The participants were asked did the training increase their confidence in identifying items in the crash cart, 55.5% (5) strongly agreed and 44.5% (4) agreed. They were asked did they feel prepared to participate in a code blue as the result of the training, 55.5% (5) strongly agreed,

33.5% (3) agreed and 11% (1) was neutral. When asked did the training process help in identifying the items in the crash cart, 78% (7) strongly agreed and 22% (2) agreed. The last statement asked, learning the crash cart contents will improve their performance in a code blue with 100% (9) strongly agreed see Table 13.

The post survey questions in Table 13 shows that 2H, 2D, 3D and 4D participants felt the training did improve their confidence in retrieving items from the crash cart. Ninety–six percent of participants reported the training strategy helped them to identify items in the crash cart and that 80% of them felt more prepared to participate in a code blue. All of the participants believed that learning the crash cart would improve their performance.

Table 13

Post Survey Questions

Post Survey Questions n-24	Hospital group	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Did the training increase your confidence in identifying and accessing the items in the crash cart?	2H 2D 3D 4D	3 5 5 5	2 0 0 4	0 0 0 0	0 0 0 0	0 0 0 0
Total/Average		(18)75%	(6)25%	(0)0%	(0)0%	(0)0%
2. Do you feel prepared to participate in a code blue as a result of the training?	2H 2D 3D 4D	1 0 3 5	3 3 1 3	0 2 0 1	1 0 1 0	0 0 0 0
Total/Average		*(9)38%*	*(10)42%*	*(3)12%*	*(2)8%*	*0%*
3. Did this training process help you identify the items in the cart needed in a code blue?	2H 2D 3D 4D	4 4 4 7	1 1 0 2	0 0 1 0	0 0 0 0	0 0 0 0
Total/Average		*(19)79%*	*(4)17%*	*(1)4%*	*(0)0%*	*(0)0%*
4. Are the labels on the crash cart drawers helpful in locating the items?	2H 2D 3D 4D	2 2 4 6	1 3 1 3	0 0 0 0	2 0 0 0	0 0 0 0
Total/Average		*(14)59%*	*(8)33%*	*(0)0%*	*(2)8%*	*(0)0%*
5. Learning the crash cart contents will improve my performance during a code?	2H 2D 3D 4D	2 5 5 8	3 0 0 1	0 0 0 0	0 0 0 0	0 0 0 0
Total/Average		*(20)83%*	*(4)17%*	*(0)0%*	*(0)0%*	*(0)0%*

Figure 26
Emerging themes extracted from the qualitative data collected

Emerging themes	Nurse comments	Changes to the instruction
Time	Nurse 2a, line 70: "More time" Nurse1c, line 51: "Offered too early in the orientation" Nurse1a, line 34:"allow for more role play" Nurse 3c, line 102:"Like to go slower" Nurse 3d, line 108: "it would be nice to have a few hours of this"	Go in early to prepare for training to save time. I could not do too much about time other than hospital D was able to give an additional half hour. Scaled down interview questions so participants had more time to practice. Reported to the educators that training should occur later on in their orientation.
Fears and Concerns	Nurse1b, line 8: "Not knowing what to do" Nurse 3c,line 88: "I don't know the medications" Nurse 3d, line 107: "I don't want read how to a put something together" Nurse 3a, line 86: "looking stupid" Nurse 3d, line 89: "I'm afraid patient might die" Nurse 4g, line 143: "wasting time and patient dying because of me" Nurse 2d, line 66: "Not knowing where to find items, not recognizing them	Provided more explanations to the participants during training. Allowed them some time to assemble items. Offered reassurance and praise. Developed booklet that details the roles and responsibilities. Provided detailed pictures of the crash cart contents.
Practice	Nurse 1d, line 49: "More hands on" Nurse 1a, line 50: "More practice" Nurse 1b, line 21: "If we could practice putting things together, finding where things are, that is how I learn" Nurse 3d, line120: "I would do a bit more and longer, let us figure out what is in the packages and the equipment"	Had participants to retrieve items rather than me. Had all participants assemble the laryngoscope and the Bristol jet syringe. Color-coded drawers with the task cards to help in retrieving items from the drawers.

Emerging themes	Nurse comments	Changes to the instruction
Medications	Nurse 3c, line 88: "I don't the medications" Nurse 1c, line 16:"I don't know what the medications are used for and how to give them" Nurse 4i, line 154: "knowing the medications"	Discussed their fears with them. Stressed the importance of following the protocol for safe medication administration. Medication chart in booklet. Used medication cards for retrieving items from the cart.

(Appendix K, p. 166)

SUMMARY

The purpose of the research study was to examine the impact of motivationally designed instruction for crash cart training on the motivational levels of the nurses. I designed and redesigned motivational instruction throughout the progression of the study. Data was collected in the form of surveys, and open-ended questions for each iterative cycle, as well as interviews and observation to drive the process. Quantitative and qualitative data were collected to determine what effects that motivational designed instruction had on nurses' motivational levels. Results from the qualitative and quantitative data were analyzed and compared between the groups and with every iterative phase. The emerging themes that were identified throughout the study were: time, fear and concerns, practice and medication administration. These emerging themes will be discussed in the next chapter.

CHAPTER FIVE

DISCUSSION AND CONCLUSION

The goal of this designed-based research study was to design an intervention utilizing a motivational instructional design for crash cart training that would result in increased levels of confidence and satisfaction for the nurses. This designed-based research study incorporated the ARCS motivational design model (Keller, 2010) and the Layers of Negotiation Model (Cennamo et al., 1996) to drive the process. For this study a variety of data collection methods were used, that included quantitative and qualitative data. In this section I discuss the findings and describe some of the events that impacted the study. I discuss the rationale and significance of the study, answer the research questions, and discuss the limitations, implications, recommendations, and then present my conclusions.

The first chapter in this research study described the purpose of the study and the challenges facing nurses attempting to master the crash cart. The second chapter incorporated an extensive review of the literature in learning theories, motivation theory, instructional design, and current trends and research conducted as it relates to crash cart training. Chapter three provided an overview of the research methodology, the rational for the research design, and the description of the data collection tools. Chapter four provided the qualitative and quantitative data collection results of the study. This final chapter five provides a discussion and summary of the phases and iterations within the research, the major findings, design challenges, implications in the field of instructional design and further recommendations for future research. The emerging themes from the data analysis included: time, fear, practice, and medications. I discuss these themes in the context of answering the research questions that guided this study:

Q 1. What is the current level of motivation and confidence for novice nurses using the crash cart?

Q 2. Is a mock code blue more effective than a motivational design approach in learning the crash cart?

Q 3. Does crash cart familiarity increase with motivational training?

Q 4. To what extent does the ARCS motivation design impact nurse confidence regarding the crash cart?

Q 5. Does the iterative design process of this designed-based research improve the outcomes for learning the crash cart?

Time

Time was a major theme identified by all of the participants. At the end of each session I queried the participants for any suggestions they had to improve the training. Overwhelming they all felt that the training did not provide enough time for practicing, and that increasing the training time would be helpful in learning the crash cart. They did not feel one hour was enough for the training and they wanted it to go slower. They felt they did not have enough time to practice with the medications or enough time to actually practice assembling the items. I was previously aware that the motivational levels increase when individuals are actively engaged in a physical activity thus my training focused more on providing as much hands-on experience as possible in the allotted time. The nurses expressed to me that the training should occur later in the orientation rather than sooner because their unfamiliarity with other procedures such as intravenous and phlebotomy.

One timesaving strategy I found useful with the first group of nurses was distribution of the supplemental booklet prior to the training. I had the nurses review the crash cart booklet so they could familiarize themselves with the material. This strategy helped to prepare nurses for the next day training. Unfortunately, I was not able to have contact with the other participants until

the day of training due to scheduling and accessibility. To compensate for this I had to do a quick review of the booklet prior to the training for all of the other participants.

While designing the training, the Layers of Negotiation Model allowed me to adjust my instruction throughout the study especially when it came to time constraints. I was able to assess how my participants were interacting with the instruction and, through social negotiations; I could adjust my training according to the size of the group and their needs. I realized I could not spend as much time on the interview questions if I wanted to provide more comprehensive hands-on experience thus I scaled down the interview questions and added some additional questions in a survey. The educator at hospital D planned to provide additional practice for participants later in the orientation in the event that I ran out of time. There was more opportunity to provide more hands-on practice when the group size was five rather than nine. The same time constraints applied to the larger group of nurses thus it did not allow them to have much practice time as the smaller groups. Gordon mentions in her study, "hands-on experience with the crash cart contents is important to establish comfort with the items involved" (2010, p. 439).

It was important to pace and sequence the information in a clear concise manner to avoid confusion given these were novice nurses that would require more guidance. I knew the time constraints could pose a problem and every attempt was made to have the environment and all paperwork prepared prior to the training. I provided the participants with examples on how to anticipate items needed in a code blue and how to develop a mental picture of these items. I achieved this by identifying common tasks in a code blue and chunking the anticipated items together using detailed colored graphics. The booklet included additional labeled pictures of all the contents in each drawer of the crash cart for further reinforcement.

Time constraints did not allow time to debrief the participants. Debriefing allows time for the nurses to reflect on their performance and to discuss what they need to improve in their practice. It allows participants time to discuss or reflect on things that they struggled with such as opening packages, assembling items or what actions they would do differently. Debriefing is a common strategy that is used in nursing education and is very useful in contextual learning environments. Debriefing provides a safe place where questions are asked, evaluating what went well and what could have been changed in an interactive conversation to encourage active learning (Hill, Dickter & Van Daalen, 2010). Clearly one hour for training did not suffice for this study nor would it be sufficient in a work place.

Fear

Participants identified fear as one of their biggest concerns with the crash cart and code blue. Particularly, they were fearful of not fully understanding their role in a code blue including not knowing the crash cart. Fear was expressed and apparent in the discussions with each group. The majority of participants reported an overwhelming fear in general when anticipating their participation in a code blue. One of their biggest concerns and fears was the contents of the crash cart.

Some of the participants had the fear of not knowing what to do in an emergency. Some reported the fear of not being able to retrieve the items from the cart and others reported the fear of looking stupid. The participants did not know or understand what their specific role was in the code blue. There was a section in the crash cart booklet that described in detail the roles of health care personnel in a code blue. To help alleviate some of their fears, I provided examples of code blue experiences and reassured them as novice nurses they would only be expected to work within their scope of practice. They expressed fear of not seeing the inside of the crash cart often enough to know where the items were. This fear also noted by Huseman (2012) when she

reported that nurses had a great deal of anxiety and lacked confidence in participating in a code blue.

One of the suggestions I offered to the participants in learning their roles in a code blue was to be an observer first in several code blues. Once they feel comfortable, they should begin to take on the role of the recorder in a code blue. Through actively documenting the sequence of events during a code blue allows the nurse to still be an observer while becoming familiar with the various processes involved. As the novice nurse masters the documentation then the nurse could move on to the responsibility of retrieving items from the crash cart then eventually mastering the medication drug drawer. Starting from simple tasks then moving to the more complex task with frequent exposures will build the confidence and decrease the fear of the unknown in a novice nurse.

Fear can be overwhelming and paralyzing to an individual leading to frustration and anxiety to the point that critical thinking becomes severely diminished. Some nurses become so nervous they are unable to open simple packages or remember what to do at all (Strzyzewski, 2006). Through addressing their fears, the individual can begin to perform with more confidence. Knowledge and training eliminate the unknowns and prepare learners for an actual code blue. When individuals perceive themselves to be inefficacious with a task they experience high anticipatory and performance distress. As they begin to perceive themselves more self-efficacious then their anxiety declines (Bandura, 1988). Novice nurses in code situations might deal with additional stress because their inexperience and lack of knowledge may make them more prone to fear (Badger, 1996).

Medications

Another fear or concern the participants reported was that they did not know the emergency medications. The supplemental book had detailed pictures of the crash cart and a list

of the medications used in a code blue. The medication drawer in the crash cart caused a lot of concerns and fears given their inexperience. Participants reported they were fearful of making mistakes, not knowing the medications, or not sure how to administer them. In this study, I could not do a comprehensive review of the emergency medications in the crash cart due to time constraints. This would have required additional time that was not available. I only could provide enough time for learners to assemble some of the syringes and practice reading the labels on the containers.

I could see that the participants were very interested and curious about the drug drawer. I knew they wanted to do more with the drug drawer by the way they drew in closer to examine the drugs. They expressed concern that if they had to administer a medication, they would not know how to give it. Others expressed they did not have the knowledge or understand how to prepare the medications or how to administer it or what would their responsibilities be in monitoring the patient. Participants were therefore very interested additional training for the medication drawer.

As a designer I concluded that frequent exposures to the commonly used drugs would address this fear or concern. Nurse educators need to consider design strategies for nurses that would help with learning the medications in the crash cart. Some institutions provide a pharmacist to administer the drugs however this is not a common practice and it does not eliminate the responsibility or accountability of the RN. As demonstrated in the beginning of the study nurses were very interested in an interactive program that they could use to practice or see the medication drawer more frequently.

Practice

Practice was the final major theme identified through the data analysis. Participants consistently suggested more practice during the training as part of the improvement process. Overall they

wanted more practice with the equipment, more practice with the drugs and more practice to review the cart on their own. Providing opportunities for the learner to practice is one of the key strategies that instructional designers use as a confidence builder. The learner must be able to repeatedly practice in a safe environment that allows for mistakes without endangering patients. Participating in practice can improve clinical skills and bolster self-confidence resulting in less vulnerability (Badger, 1996). Novice nurses learn to perform skills accurately and consistently with guidance eventually developing proficiency as they master the task.

Nurses' narrative responses reported hands-on practice and experience (39, 18.4%) as most valuable aspect of the training sessions. The simulation enhanced their knowledge and skills "to become familiar with the proper procedures, algorithms, meds and crash cart" (Wehbe-Janek et al., p.46). Increased confidence and comfort (15, 7.1%) was reported, "I feel more confident in using the crash cart and knowing the location of things in the crash cart" (Wehbe-Janek et al., p. 45). Deliberate practice via simulation was shown to improve the competence of doctors in procedural skills and enhanced their quality of patient care in an actual code (Wayne, Didwania, Feinglass, Fudala, Barsuk & McGaghie, 2008).

One of my strategies for building learner self-confidence was providing the nurses with the information and time to practice some newly acquired skills needed to function effectively in a code. Initially with the first group of nurses I removed the items from the crash cart and explained what each item was. This group of participants made it very clear they would like to have more practice with the contents. I revised the instruction based on their feedback to engage the next group of participants actively by having them retrieve all the items from the cart. I immediately observed that the subsequent groups enjoyed removing items from the cart. The more they were able to handle the items the more they laughed and felt comfortable in not knowing what the name of the item, because their counterparts were encouraged to support them

if they got stuck. Through exposure of the crash cart and providing practice I was able to eliminate some of the unknown fear.

Research Questions

Research Question 1: What is the current level of motivation and confidence for novice nurses using the crash cart? Extensive review of the literature reveals that nurses lack confidence when accessing the crash cart or participating in a code blue. Huseman (2012) reported that nurses had a great deal of anxiety and lacked confidence in participating in a code blue. Nurses in my study were asked prior to the training what was their biggest fear or concern when participating in a code blue. The participants reported they were afraid of not knowing what to do, afraid of making a mistake and afraid the patient may die. They also reported not knowing where things are in the crash cart and not knowing the medications in the cart. Dwyer and Williams (2002), reported similar findings in their research where nurses reported experiencing feelings of insecurity, fear of missing something or unfamiliarity with equipment and the overall disorganization experienced during a code.

I observed that the participants in my study did not know where the items were in the cart. They did not know how to assemble some of the items, and at times, did not know its use or name. The participants were all novice nurses and the majority of them expressed they were not confident in participating in a code blue. The nurses reported they did not feel comfortable with the medication drawer. The majority of the nurses 71% (20) reported that they had not participated in a code blue. Only 22% agreed that they felt confident in participating in a code blue.

Research Question 2: Is a mock code blue more effective than a motivational design approach in learning the crash cart? I found that in my study a motivational designed approach for teaching the crash cart to novice nurses was more effective than a mock code blue.

Taking a motivational design approach allowed me to build motivational strategies into the context of the crash cart activity making it more engaging. For example by adding more physical activity to the training, the nurses became more actively involved with the cart. Social interaction was another part of the motivational design that provided the participants more opportunities to support each other and problem solve together during the training. I created a safe environment that allowed for the participants to make mistakes giving them praise and feedback. Learners will strive for success, if they feel they can make mistakes without punitive consequences (Spitzer, 1996).

As iterations occurred throughout the study the subscales in the ARCS model had showed improvement. Each design phase addressed the motivational levels of the participants through multiple revisions targeting areas where scores were low. Through the social interactions with the participants and the design team the instruction was modified to meet the needs of the learner. I made revisions to the instruction when participants reported they were bored or the scores in the subscale indicated a need for improvement. I used various strategies that would get the attention of the participant, show the relevance of the training, focused on increasing the confidence levels to ensure the training would be satisfying. Through my observations I could see that the nurses were more engaged when I made revisions to the instruction to have them become more actively involved.

As mentioned earlier, a pilot study at Mercy San Juan Medical Center in California staff were provided a half-day of training that included lecture, four mock code scenarios and debriefing sessions (von Arx and Pretzlaff, 2010). It was reported in the pre survey that participants indicated their comfort level in participating in a code, comfort in finding equipment and confidence in using the equipment scored lowest and continued to remain lower in the post

survey even though there was improvement noted in the post survey after the training (von Arx and Pretzlaff, 2010).

We do know that in the literature nurses are still reporting the lack confidence and comfort with the crash cart. Upon examining the CIS results in the subcategories in the ARCS model, utilizing the design strategies recommended by Keller, CIS scores increased with each of the iterations. There was an overall improvement in this study in the areas of attention, relevancy, confidence and satisfaction with the training where other studies have failed to look at each of these components.

Considering that one of the most common methods for teaching nurses about the crash cart continues to be in the form of a mock code, one may conclude that a motivational design approach would address the concerns that nurses still continue to experience and report. Using the old adage, "putting the cart before the horse", mock code blue should occur after mastering the crash cart not before. Nursing educators must consider what the purpose of a mock code blue is and who would be most suitable to participate in this activity. In this study the participants were not clearly prepared to participate in a mock code blue. Their unfamiliarity with the items and inexperience would create more chaos and confusion for them in a mock code blue.

Research Question 3: Does crash cart familiarity increase with motivational training? Familiarity increased with motivational training. I used several design strategies to get the participants familiar with the crash cart. I provided the crash cart booklet to each participant so they could familiarize themselves with the process of code blue and the contents of the crash cart. I used discussion and examples of code blue situations to link what they already knew and to determine what they did not know. This strategy gained their attention, and gave me some insight into what they knew specifically about the crash cart. Prior to the training, 75% of all the participants had reported that they had not reviewed the contents of the crash cart since

becoming a RN. As a result of not being familiar with the crash cart most of the participants reported they were afraid and felt anxious.

As the training progressed it was evident that participants were able to recognize and retrieve items from the cart successfully. Once they had learned the name of the item, its use and how to assemble it, they were able to complete the task on the card given to them. As iterations occurred in the research I observed that the more the participants retrieved the items successfully from the cart the more they wanted to practice. They requested scenarios to be added to the training so they could put what they had learned into practice. In the post survey question 100% of the participants believed learning the contents of the crash cart would improve their performance in a code blue (Table 13). Collectively the group indicated they preferred more hands-on training, and another participant stated, "I want to go into the cart myself".

Using Keller's motivational design and strategies suggested by him helped to increase the familiarity with the crash cart (Keller, 2010). More practice and time was a common request from learners in each of the training sessions, and this was identified as one of the emergent themes in this study. Collectively they agreed they would not have been able to participate in a code blue without first becoming familiar with the cart.

Research Question 4: To what extent does the ARCS motivation design impact nurse confidence about the crash cart? At the onset of this study, the literature discussed how nurses continued to report in numerous studies that they did not feel confident in a code blue. The ARCS model specifically provided me strategies that targeted confidence levels in the instructional design of my study. Fear and anxiety can greatly reduce the productivity and confidence level of nurses. It's not uncommon for nurses to become nervous and lose their confidence forgetting even simple nursing interventions or what to do at all (Strzyzski, 2006).

My strategy was to empower the nurses through knowledge and practice with the crash cart so they would feel they could successfully participate in a code blue. I minimized their fears by making the unknown known. In other words my strategy was to simply remove the mystery of the crash cart and build up learner confidence by allowing them to successfully retrieve the items from the crash cart in a safe practice environment. I reinforced the belief that they could function effectively in a code blue once they were familiar with the process. Through mental imaging and anticipating items needed in a code blue the nurses felt they had more control over the crash cart.

There was marked improvement in all areas from the start of the study to the end of the study. The group scores from the CIS ranged from 3.43 (0.86) with the first group to 4.72 (0.12) with the last group for the subscale confidence (Table 11). Using the ARCS model and design strategies demonstrated that nurses' confidence levels increased as the study progressed as shown in the results. Through careful analysis of all the data from each subscale the design team was able to make revisions based on the participants' scores and their feedback as evidenced by the final group 4D scores. Improvements to the instruction were made through the active involvement of the participants that lead to an increase in their confidence levels.

Research Question 5: Does the iterative design process of this designed-based research improve the outcomes for learning the crash cart? Designed-based research provided me a method for designing an educational intervention that supported the crash cart training in a contextualized learning environment. The iterative design forced the design team, to examine and reexamine various parts of the instruction. This process allowed for me to pilot the training making refinements throughout my study. As the researcher and designer, the iterations allowed me to observe how the training worked in a practice setting with the nurses. Their feedback, the data collection and their social interactions with the training were continually

analyzed during each phase until the instruction reached a level of perfection and satisfaction with the nurses.

The iterative nature is an important feature of this process because it gets to the heart of the problem and allows for the designer to address it without starting over. I was able to make improvements to my training targeting identified areas of weakness from the CIS results. I could specifically adjust areas in my training where participant's CIS scores were low or where participants made suggestions for improvements. For example, I incorporated more time for physical activity to maintain their attention and motivational levels. I designed strategies that would provide different opportunities for the nurses to learn the crash cart. I handed out task cards for retrieving items, as well as chunked the information so the nurses could create mental images for anticipating items. I developed the booklet using design strategies to capture their attention. I provided more feedback and recognition to the participants to build their confidence as the study progressed. With each cycle there was an opportunity to improve the instruction collaboratively with the participants. The data results indicated that the iterative design process improved the outcomes for learning the crash cart. Table 13 shows the improved scores of each of the subscales in the CIS from the start of the research study to the end of the study.

Design Study Challenges

Designed-based research focuses on the methodology for carrying out educational interventions and how the design works into practice. Context is central to this research design in conjunction with social interaction and observation of the participants is key. There were some design challenges in this designed-based research study that I encountered. The first challenge of this study was getting the approval of the nursing research committee within the organization and then an additional research approval from the hospital research board. This was challenging because the committee was not knowledgeable on design-based research, and this required

multiple submissions that could only be reviewed once a month by the committee. I resolved this by providing additional information that helped to inform the research committee on the topic of designed-based research.

The second challenge I encountered was the time constraints that were imposed by the educators and the organization. I had realized early on, that going into an organization would require the buy-in of the hospital leaders and the educators. As with any community, researchers must work within the organization and with the leaders to mutually agree upon the timelines and constraints. The educators decided when the training would occur and the length of the training was allotted for one hour, however there were times I was able to obtain some additional time.

The third challenge was the condition of the crash cart because of the variations between the hospitals. This was somewhat challenging, because the crash cart at one hospital was over five years outdated and missing several items. This made it contextually difficult for the participants to learn the crash cart. The participants that were trained at hospital H with the outdated cart had made comments about the cart. I observed the nurses did not engage fully with the training because some of the items were broken or missing, and the cart did not look like the one in their departments. I observed the other participants at hospital D interacting with their cart and they were able to find the items and assemble them more quickly and easily. I could tell by the way they searched for the items that they were engaged.

Rationale and Significance of the Study

The rationale and significance of this study was based on a thorough review of existing literature, my own nursing experiences, and observations I have made as a nurse educator. There was a need to address how a nurse becomes proficient in using the crash cart. Traditionally nurses are trained in learning the crash cart through simulated mock code blues or by participating in a code blue on the job. As the literature revealed, these methods might not be

effective and there still remains the need to examine other strategies to address code blue training. This research study sought a solution through the use of motivational design strategies that would improve code blue training and add to the body of knowledge in instructional design and motivation.

The simulated code blue works well with experienced nurses, however with the novice nurse, inexperience makes it difficult to link the scenario to any previous experiences. During a code situation the nurse usually commands the crash cart. The problem herein lies; the nurse is unfamiliar with the crash cart. Learning a crash cart while participating in a code blue increases the anxiety and decreases the confidence of a nurse, because of the unfamiliarity and uncertainty with the situation. Turjanica (1999, p 45) stated, "being prepared-knowing what to expect and how to accomplish goals gives you the basis for a cool headed response". Nurse educators play a significant role in the design, development and implementation of teaching strategies to ensure knowledge and skill acquisition of healthcare providers (Dorney, 2011). Thus, the importance of designing instruction that address those key components that Keller identified in his ARCS model and the design principles as demonstrated in the Layers of Negotiation model.

Often in clinical practice the nurse does not come in contact with the contents of the crash cart, because carts remain locked until there is an emergency situation. Much time is lost searching for supplies, not recognizing the equipment or knowing the location of items during a code blue. Some critical elements and key motor skills identified in Granneman's and Conn's (1996) evaluation of code blue education were: assembling a laryngoscope, use of an ambu bag, and placement of electrocardiogram leads. Huseman (2012) reports that most healthcare professionals cannot perform during a code blue due to a variety of factors: anxiety, lack of training, and poor recall of previously learned skills. "When a rare Code Blue does occur, the

bedside nurses are at best anxious and at worst incompetent" (Keys, Malone, P., Brim, Schoonover, Nordstrom, & Selzler, 2009, p. 560).

The significance in the above study is that perhaps improved proficiency in using the crash cart would increase response times in a code blue. There is not a lot of information about how much time is wasted in obtaining items from a crash cart, although little is reported about how much anxiety and fear is associated with this activity. It stands to reason mastering the crash cart would decrease the response times, while increasing levels of confidence and proficiency. Several studies report that nurses experience great difficulty because of infrequent exposures to code blues and the lack of training, and the findings support the need to examine other strategies to address these areas.

The results of this study may not be generalizable due to a small sample size however it does show the effectiveness of designed-based research in the development of motivational designed instruction for the crash cart. The study did not intend to address how nurses would maintain their motivational levels with the acquired skills or how they would retain their newly acquired skills.

Assumptions

As the principle investigator and nurse educator working with novice nurses as participants, I believed that some assumptions would impact my study. My first assumption was that the novice nurse would be highly motivated in learning the crash cart. The relevance and novelty of this activity drives their desire to master the crash cart as it relates to one of their job expectancies. However, the motivational levels of each nurse were varied therefore requiring several strategies to meet their various needs. Even though the nurses may be highly motivated I assumed there would be much fear expressed due to the unknowns of the crash cart. Secondly, I assumed the participants' motivation and behavior using motivational strategies would improve their

proficiency in using the crash cart. Lastly, throughout this process I assumed using designed-based research and the ARCS model would improve the instruction resulting in the increased confidence levels of the participating nurses.

Implications and Recommendations

There are several implications and recommendations that designed-based research utilizing a motivational design model has on the field of instructional design as well as in nursing education. The aim for designed-based research is to refine both theory and practice contributing to the existing body of research to provide a deeper understanding of motivational design for learning and performance. There are many instructional design models and strategies utilized in the field today with the trend to utilize strategies that are learner focused, and that are relevant to the learner. Keller's motivational design model provides a framework addressing the four components of motivation that he has identified as: attention, relevance, confidence and satisfaction for designing effective instruction (2010). Keller provides many strategies for developing instruction that will motivate the learners. According to Keller (2010) motivational design can have an impact on work, improve self-regulation and even components of a person's personality (Keller, 2010). As stated in various sections of this research paper, environment, context, feedback and learner involvement, even when the instruction is based on instructional principles can still fail to motivate some students to learn (Keyes et al., 2009; Omrani et al., 2012).

Designed-based research provides an opportunity for the designer of instruction to use proven methods through iterative cycles of data collection and analysis, allowing for the designer to refine the intervention according to the information interpreted from the data (Reeves, 2006). This recursive approach will result in a deep and comprehensive understanding of the theoretical

underpinnings of the guiding principles for developing authentic learning experiences (Reeves, 2006).

Keller's motivational model was used systematically in conjunction with the Layers of Negotiation model to complete the crash cart training. The Layers of Negotiation model provides an opportunity for designers of instruction to make social negotiations an integral part of their design. This model allows for the designer to examine the material from multiple perspectives using a recursive process where the emphasis is on the client. As demonstrated in this research study, the iterative cycles of reviewing and modifying training proved to provide a more satisfying learning experience. With each cycle of training the participants was an integral part of the design process. The participants exchanged their ideas and articulated what they thought would provide them the most beneficial type of training. This process allowed the researcher and design team to develop instruction that engaged the educators of the hospitals and the participants utilizing the Layers of Negotiation model.

As designers we can also acknowledge that even the best made plans for instruction can sometimes be affected even by outside factors beyond our control. Every attempt should be made by the designer to anticipate complications that may occur such as: technical, mechanical, time constraints and knowing your audience that could impact the design and training. Time constraints placed on this training impacted the learning experience as did class size and condition of equipment. In every phase of the instruction the participants all commented on not having enough time for the training. When designing instruction we must be adaptable and be able to sometimes make some changes on the spot depending on the conditions of learning and the learning environment.

Nurse educators that design and provide instruction for nurses should consider the results of this study that have demonstrated training should be based on the needs of the learner utilizing

design strategies and principles for effective instruction. Nursing educators should make every attempt to develop instruction using the ARCS model and the Layers of Negotiation model. Often materials are developed not using theoretical design principles and more often on the educator's expertise which may lead to a less robust instructional design. In this study many participants voiced their fears or concerns regarding the crash cart. Keller's motivational strategies were used to address the participants' fears and concerns. Social negotiations involving the participants and the iterative nature of the research-based design methodology allowed for the designer to make necessary changes to the instruction. These strategies improved the overall instruction with results in all ARCS subscales gradually improving with each group of participants.

Educators must consider the type of training, the sequence in which it occurs and the number of participants to be trained at one time. This was evident in this study where both hospitals provided some code blue training to the nurses or exposure to the crash cart with very little consideration of the learner's needs. As reported in this study, one participant stated there were fifteen in a group when she received her training that made it difficult to be fully engaged or to actively participate. Using outdated or broken equipment for training makes it very difficult for the learner to value the training and more often to transfer and apply that training in a real setting. If educators don't lead by example and do not take pride in their instruction, how can the learners feel motivated to learn?

Time constraints often are the main culprit in interfering with training and practice. Educators need to consider strategies on how to provide more time for nurses to practice and familiarize themselves with the crash cart. One strategy that can be used is to develop task cards and have the nurses anticipate and retrieve the items from the cart. This can be achieved through

drills and frequent exposure to a cart. Clearly mock code blues are not as effective initially with novice nurses.

This study illustrated how design-based research was used to design motivationally designed instruction using the layers of negotiation model and the challenges the designer encountered during the study. As the need increases either in the workplace or in educational settings providing sound instruction or training will require nurse educators or instructional designers to develop materials using the design principles and strategies. This study demonstrated how involving the learners in the design and development of the training proved to more effective in satisfying the learner by addressing their needs instead of those of the educators.

FUTURE RESEARCH

Replicating this study would add to the literature and knowledge of what is already known about confidence levels of nurses that have participated in a code blue. Future suggestions in nursing research would be to utilize a motivational design model for developing code blue training. Furthermore, an examination of response times for nurses retrieving items from a crash cart and the impact if any, does it have on the outcomes in a code situation. Other research should examine how increasing nurse confidence levels would impact the performance in code blue. Future research suggestions for instructional designers would be to continue investigating instructional design using research design-based methodology in combination with Keller's motivational model since there is very little research if any found in the literature.

Further studies need to examine how to decrease or eliminate the fears and concerns of nurses with the crash cart using motivational designed instruction. Research studies should examine retrieval times for accessing items and the familiarity with the crash cart as it relates to the outcomes of a code blue. Although this study did not involve a large group of participants

this study demonstrated how an iterative process that included the participants in the design of the instruction was effective. The results from this study provided instructional designers and educators in nursing insight into designed-based research and sound instructional strategies employed by the design team. The results of the study and lessons learned make this a valued contribution to the field instructional design and in the field of nursing education.

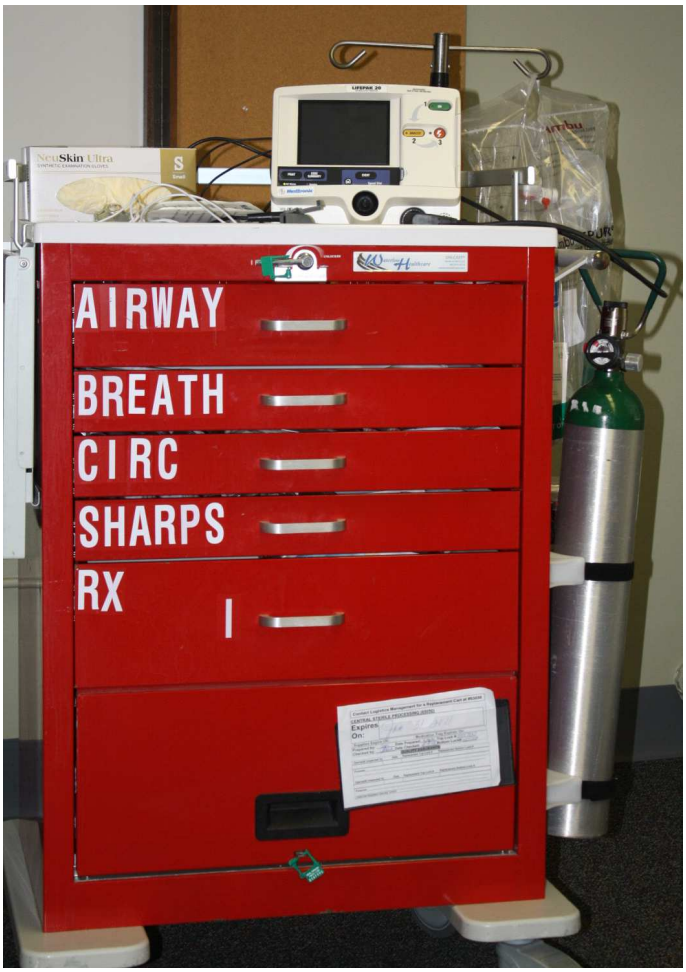
CONCLUSION

This study answered the five questions posed in chapter one. Through the iterative actions of design-based research of data collection, analysis and revisions throughout the study demonstrated that a designer could effectively design sound motivational instruction. Based on quantitative and qualitative data analysis in this study, motivational instructional design principles proved that providing crash cart training initially does increase the confidence levels of nurses making this finding relevant in nursing. There were four themes that were identified and discussed in this study: time, fear, practice and medications. Each of these themes were consistent with other nursing studies on code blues however those studies did not have any solutions or strategies that would target those areas identified in the literature.

The study supported previous studies that concluded motivational design does impact the learning experience. Utilizing sound design principles based on motivational theories can make instruction effective focusing on the four categories Keller identified as the ARCS model. The study demonstrated how the designed-based methodology in conjunction with motivational strategies could be applied to training nurses and improving their confidence levels. As designers and educators start to conduct more designed-based research studies, there will be a greater influx of information for all of us to draw upon.

APPENDIX A

Crash Cart



APPENDIX B
IRB Approval

WAYNE STATE UNIVERSITY

IRB Administration Office
87 East Canfield, Second Floor
Detroit, Michigan 48201
Phone: (313) 577-1628
FAX: (313) 993-7122
http://irb.wayne.edu

NOTICE OF EXPEDITED APPROVAL

To: Debra Amaro
College of Education

From: Dr. Deborah Ellis or designee K. Campbell-Voytal/PB.
for Chairperson, Behavioral Institutional Review Board (B3)

Date: February 18, 2014

RE: IRB #: 012814B3E

Protocol Title: A Design-Based Research Study Examining the Impact of Using a Motivational Model for Mastering the Crash Cart

Funding Source:

Protocol #: 1401012704

Expiration Date: February 17, 2015

Risk Level / Category: Research not involving greater than minimal risk

The above-referenced protocol and items listed below (if applicable) were **APPROVED** following *Expedited Review* Category (#6 #7)* by the Chairperson/designee *for* the Wayne State University Institutional Review Board (B3) for the period of 02/18/2014 through 02/17/2015. This approval does not replace any departmental or other approvals that may be required.

- Revised Protocol Summary Form (received in the IRB Office 2/18/2014)
- Protocol (received in the IRB Office 1/8/2014)
- Behavioral Research Informed Consent (dated 2/18/2014)
- Invitation to Participate Letter
- Crash Cart Training Interview Questions
- Researcher Journal
- Data Collection Tools: Demographic Information survey, Course Interest Survey, Instructional Materials Motivation Survey, and Confidence Opinion Survey

* Federal regulations require that all research be reviewed at least annually. You *may* receive a *"Continuation Renewal Reminder"* approximately two months prior to the expiration date; however, it is the Principal Investigator's responsibility to obtain review and continued approval ***before*** the expiration date. Data collected during a period of lapsed approval is unapproved research and can never be reported or published as research data.
* All changes or amendments to the above-referenced protocol require review and approval by the IRB **BEFORE** implementation.
* Adverse Reactions/Unexpected Events (AR/UE) must be submitted on the appropriate form within the timeframe specified in the IRB Administration Office Policy (http://www.irb.wayne.edu//policies-human-research.php).

NOTE:

1. Upon notification of an impending regulatory site visit, hold notification, and/or external audit the IRB Administration Office must be contacted immediately.
2. Forms should be downloaded from the IRB website at **each** use.

*Based on the Expedited Review List, revised November 1998

APPENDIX C

Nursing Committee Approval

November 20, 2013

Dear Ms. Amaro,

We are pleased to inform you that your study, *A design-based research study examining the impact of using a motivational model for mastering the crash cart* has been approved for conduct at a Detroit Medical Center facility.

We found 1) your research design is sound enough to yield the expected knowledge, 2) the aims/objectives are likely to be achievable within the given time period, 3) the rationale for the proposed number of participants is reasonable, and 4) the scientific design is described and adequately justified.

You still need to obtain permission from the Detroit Medical Center through the DMC research review process (http://content.dmc.org/researchreviewprocess) and from the Wayne State University Institutional Review Board (www.irb.wayne.edu) if you have not already done so. **Upload a copy of this letter with your proposal for the DMC research review in order for the review to be expedited**. Request waiver of the DMC research fee because this is an unfunded study.

The Nursing Research Council will need progress reports six months after approval of your study, on **May 20th**, and a final report at the conclusion of your study, please send to me at m.campbell@wayne.edu.

DMC nurses value learning about the results of research conducted in our system. Please plan to share the results of your study as an educational offering or a report to the staff that were engaged in your investigation.

Best wishes in the conduct of your study,

Meg Campbell PhD, RN, FPCN
Chairperson
DMC Nursing Research Council

APPENDIX D

Consent Form

[Behavioral] Research Informed Consent

Title of Study: *A Designed-based Research Study Examining the Impact of Using a Motivational Model for Mastering the Crash Cart*

Principal Investigator (PI): Debra Amaro
Wayne State University
248-826-3757

Purpose

You are being asked to be in a research study of developing crash cart training using a motivational model because you are a novice/beginner nurse. This study is being conducted at Harper and Detroit Receiving Hospitals. The estimated number of study participants to be enrolled at Harper and Detroit Receiving Hospital is about 15. **Please read this form and ask any questions you may have before agreeing to be in the study.**

In this research study, the purpose is to design instruction using a motivational model for crash cart training. This study relies on the participant's feedback after completing the training and reviewing the materials. This design-based research is a cyclic process that requires at least three design revisions based on feedback from each group of participants.

Study Procedures

If you agree to take part in this research study, you will be asked to actively participate in the crash cart training and provide your feedback to the researcher so revisions can be made to the design of the training.

1. As part of the research study you will be required to fill out a demographic questionnaire, a course interest survey, a confidence opinion survey and a brief follow up interview after the training. You will be provided resource material for your convenience to review the crash cart. You will be placed a group of five participants for the crash cart training. This research is not an experimental design rather it seeks to examine how a motivational design model will improve the confidence and satisfaction of using the crash cart.
2. The crash cart training take approximately 1 hour. The demographic survey and the confidence opinion survey will take approximately 10 minutes. The course interest survey will take approximately 15 minutes. When the training is completed a brief telephone or face-to-face interview will take about 10 minutes of your time.
3. You will be required to answer the course interest survey selecting what truly applies to you, which is formatted in a likert scale ranging from not true to very true responses. The interview questions require a yes/no response with some open-ended questions.
4. Your identity will be kept confidential and each participant's responses will be coded to protect your anonymity.

Benefits

The possible benefits to you for taking part in this research study are the opportunities to actively participate in evaluating and providing your input into instructional materials and course evaluation. You will have received additional training to advance your knowledge regarding crash carts. Additionally, other nurses may benefit as a result of this study for future crash cart training.

Risks

By taking part in this study, you may experience the following risks: There may be a slight social risk to you because I will be keeping a master list of names and contact information. I will however minimize this risk by storing your information in a secured lock filing cabinet off site, only accessible to only the researcher. All information collected will be coded so the participant's identity will remain anonymous and confidential.

Study Costs

- Participation in this study will be of no cost to you.

Compensation

You will not be paid for taking part in this study. As an incentive for your complete participation you will by being entered into a raffle for a gift certificate valued at $100.00 from a local uniform store. There will only be one winner and to be eligible you must complete the study. The drawing will occur at the end of the research study and the winner will be notified by email.

Research Related Injuries

In the event that this research related activity results in an injury, treatment will be made available including first aid, emergency treatment, and follow-up care as needed. Care for such will be billed in the ordinary manner to you or your insurance company. No reimbursement, compensation, or free medical care is offered by Wayne State University or Detroit Medical Center. If you think that you have suffered a research related injury, contact the PI right away at 248-826-3757.

Confidentiality

All information collected about you during the course of this study will be kept confidential to the extent permitted by law. You will be identified in the research records by a code name or number. Information that identifies you personally will not be released without your written permission. However, the study sponsor, the Institutional Review Board (IRB) at Wayne State University, or federal agencies with appropriate regulatory oversight [e.g., Food and Drug Administration (FDA), Office for Human Research Protections (OHRP), Office of Civil Rights (OCR), etc.) may review your records.

When the results of this research are published or discussed in conferences, no information will be included that would reveal your identity. If audiotape recordings of you will be used for

research or educational purposes, your identity will be protected or disguised. I will transcribe any tape recordings and code the information to maintain your anonymity. A second qualitative researcher will review the coded taped information to ensure accuracy and the integrity of the study. You as the participant will have access to the recorded information at anytime for your review and/or editing the information. Once the research is completed the recordings will be deleted and master list will be destroyed through shredding.

Voluntary Participation/Withdrawal

Taking part in this study is voluntary. You have the right to choose not to take part in this study. You are free to only answer questions that you want to answer. You are free to withdraw from participation in this study at any time. Your decisions will not change any present or future relationship with Wayne State University or its affiliates, or other services you are entitled to receive.

The PI may stop your participation in this study without your consent. The PI will make the decision and let you know if it is not possible for you to continue. The decision that is made is to protect your health and safety, or because you did not follow the instructions to take part in the study

Questions

If you have any questions about this study now or in the future, you may contact Debra Amaro at the following phone number 248-826-3757. If you have questions or concerns about your rights as a research participant, the Chair of the Institutional Review Board can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call (313) 577-1628 to ask questions or voice concerns or complaints.

Consent to Participate in a Research Study

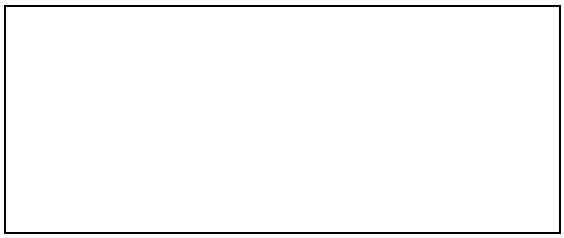
To voluntarily agree to take part in this study, you must sign on the line below. If you choose to take part in this study you may withdraw at any time. You are not giving up any of your legal rights by signing this form. Your signature below indicates that you have read, or had read to you, this entire consent form, including the risks and benefits, and have had all of your questions answered. You will be given a copy of this consent form.

_____ _____
Signature of participant Date

_____ _____
Printed name of participant Time

_____ _____
Signature of person obtaining consent Date

_____ _____
Printed name of person obtaining consent Time



APPENDIX E

Letter of Support

Letter of support educator for design team

This is a letter of support and commitment to the crash cart training research. I am a DMC employee working as rapid response nurse at SGH and have agreed to volunteer as part of Debra Amaro's research design team. I support this research, as I have seen first hand how nurses struggle with the crash cart and it's contents and looking forward to working on this project. As a rapid responder who has observed time and again nurses who are unfamiliar with how to access the crash cart contents in a productive fashion, I feel this research and training will be beneficial to patient outcomes. I will volunteer my expertise outside of my current job responsibilities on my own time.

Thank you

Michael Banish BSN CEN
248-250-3650

Letter of support

This is a letter of support for the research that is being conducted regarding crash cart training for nurses. I am a Clinical Nurse Specialist at the DMC and have worked in Acute Care for over 35 years. Over the course of time, I have seen patients admitted to the hospital in a more acute and complex state of health. Unfortunately nurses are also graduating with fewer hands on skills to deal with the many life threatening events that occur on a daily basis. There is less opportunity for nurse internships as budgets have scaled back hospital opportunities for the new nurse. Many nurses now graduate from nursing with a second degree and experience less clinical time. Even nurses who have worked for years on the unit are having to adapt to the high acuity without sufficient skills. I feel this research and training is very timely and will be an asset not only to the bedside nurse but to the patients for whom their care is entrusted. I will volunteer my expertise to assist with this very worthwhile project. This will occur outside of my regular work duties on my own time. I look forward to the opportunity to participating in this project.

Sincerely,

Reva Klar, RN, MSN, GCNS-BC
Clinical Nurse Specialist

APPENDIX F

Course Interest Survey

There are 34 statements in this questionnaire. Please think about each statement in relation to the instructional materials you have just studied and indicate how true it is. Give the answer that truly applies to you, and not what you would like to be true, or what you think others want to hear.

Think about each statement by itself and indicate how true it is. Do not be influenced by your answers to other statements.

Circle your responses on the answer sheet that is provided and follow any additional instructions that may be provided in regard to the answer sheet that is being used with this survey. Thank you.

1. **The instructor knows how to make us feel enthusiastic about the subject matter of this training.**

Not True Slightly True Moderately True Mostly True Very True

2. The things I am learning in this class will be useful to me.

Not True Slightly True Moderately True Mostly True Very True

3. **I feel confident that I will do well in this class.**

Not True Slightly True Moderately True Mostly True Very True

4. **This class has very little in it that captures my attention.**

Not True Slightly True Moderately True Mostly True Very True

5. **The instructor makes the subject mater of this class seem important.**

Not True Slightly True Moderately True Mostly True Very True

6. **You have to be lucky to succeed in this class.**

Not True Slightly True Moderately True Mostly True Very True

7. **I have to work too hard to succeed in this class.**

Not True Slightly True Moderately True Mostly True Very True

8. I do NOT see how the content of this class relates to anything I already know.

Not True Slightly True Moderately True Mostly True Very True

9. Whether or not I succeed in this class is up to me.

Not True Slightly True Moderately True Mostly True Very True

10. The instructor creates suspense when building up to a point.

Not True Slightly True Moderately True Mostly True Very True

11. The subject matter of this class is just too difficult for me.

Not True Slightly True Moderately True Mostly True Very True

12. I feel that this class gives me a lot of satisfaction.

Not True Slightly True Moderately True Mostly True Very True

13. In this class, I try to set and achieve high standards of excellence.

Not True Slightly True Moderately True Mostly True Very True

14. I feel that the attention I received is fair compared to other participants.

Not True Slightly True Moderately True Mostly True Very True

15. The participants in the class seemed interested in the topic.

Not True Slightly True Moderately True Mostly True Very True

16. I enjoy participating in this class.

Not True Slightly True Moderately True Mostly True Very True

17. It is difficult to predict how my performance in this class will be evaluated by the instructor.

Not True Slightly True Moderately True Mostly True Very True

18. I am pleased with the instructor's appraisal of my performance compared to how well I think I have done.

Not True Slightly True Moderately True Mostly True Very True

19. I feel satisfied with what I received from this class.

Not True Slightly True Moderately True Mostly True Very True

20. The content of the class related to my expectations and goals.

Not True Slightly True Moderately True Mostly True Very True

21. The instructor did unusual or surprising things that were interesting.

Not True Slightly True Moderately True Mostly True Very True

22. The nurses actively participated in this class.

Not True Slightly True Moderately True Mostly True Very True

23. To accomplish my goals, it is important that I do well in this class.

Not True Slightly True Moderately True Mostly True Very True

24. The instructor used a variety of interesting teaching techniques.

Not True Slightly True Moderately True Mostly True Very True

25. I do NOT think I will benefit much from this class.

Not True Slightly True Moderately True Mostly True Very True

26. I often daydreamed during this class.

Not True Slightly True Moderately True Mostly True Very True

27. While I took this class, I believed that I could succeed if I tried hard enough.

Not True Slightly True Moderately True Mostly True Very True

28. The personal benefits of this class were clear to me.

Not True Slightly True Moderately True Mostly True Very True

29. My curiosity was often stimulated by the questions asked or the problems presented during this class.

Not True Slightly True Moderately True Mostly True Very True

30. I found the challenge level in this class to be about right: neither too easy nor too hard.

Not True Slightly True Moderately True Mostly True Very True

31. I felt rather disappointed with this class.

Not True Slightly True Moderately True Mostly True Very True

32. I felt that I got enough recognition for my participation in this class by means of instructor comments or other feedback.

Not True Slightly True Moderately True Mostly True Very True

33. The amount of work I had to do was appropriate for this type of class.

Not True Slightly True Moderately True Mostly True Very True

34. I got enough feedback to know how well I was doing.

Not True Slightly True Moderately True Mostly True Very True

APPENDIX G

Instructional Materials Motivation Survey

There are 36 statements in this questionnaire. Please think about each statement in relation to the instructional materials you have just studied and indicate how true it is. Give the answer that truly applies to you, and not what you would like to be true, or what you think others want to hear.

Think about each statement by itself and indicate how true it is. Do not be influenced by your answers to other statements.

Circle your responses on the answer sheet that is provided and follow any additional instructions that may be provided in regard to the answer sheet that is being used with this survey. Thank you.

1. **When I first looked at this material, I had the impression that it would be easy for me.**

Not True Slightly True Moderately True Mostly True Very True

2. **There was something interesting at the beginning of this material that got my attention.**

Not True Slightly True Moderately True Mostly True Very True

3. **This material was more difficult to understand than I would have liked for it to be.**

Not True Slightly True Moderately True Mostly True Very True

4. **After reading the introductory information, I felt confident that I knew what I was supposed to learn from this class.**

Not True Slightly True Moderately True Mostly True Very True

5. **Completing the activities in this material gave me a satisfying feeling of accomplishment.**

Not True Slightly True Moderately True Mostly True Very True

6. **It was clear to me how the content of this material was related to things I already knew.**

Not True Slightly True Moderately True Mostly True Very True

7. Many of the pages had so much information that it was hard to pick out and remember the important points.

Not True Slightly True Moderately True Mostly True Very True

8. These materials were eye-catching.

Not True Slightly True Moderately True Mostly True Very True

9. There were pictures or examples that showed me how this material could be important to nurses.

Not True Slightly True Moderately True Mostly True Very True

10. Understanding this material fully was important to me.

Not True Slightly True Moderately True Mostly True Very True

11. The quality of the writing helped to hold my attention.

Not True Slightly True Moderately True Mostly True Very True

12. This material was so abstract that it was hard to keep my attention on it.
Not True Slightly True Moderately True Mostly True Very True

13. As I worked on this material, I felt confident that I could learn the content.

Not True Slightly True Moderately True Mostly True Very True

14. I enjoyed this material so much that I would like to learn more about this topic.

Not True Slightly True Moderately True Mostly True Very True

15. The pages of this material looked dry and unappealing.

Not True Slightly True Moderately True Mostly True Very True

16. The content of this material was relevant to my practice.

Not True Slightly True Moderately True Mostly True Very True

17. The way the information was arranged on the pages helped keep my attention.

Not True Slightly True Moderately True Mostly True Very True

18. There were explanations or examples of how nurses should use the knowledge in this material.

Not True Slightly True Moderately True Mostly True Very True

19. The activities in this material were too difficult.

Not True Slightly True Moderately True Mostly True Very True

20. This material contained information that stimulated my interest.

Not True Slightly True Moderately True Mostly True Very True

21. I really enjoyed studying this material.

Not True Slightly True Moderately True Mostly True Very True

22. The amount of repetition in this material caused me to get bored at times.

Not True Slightly True Moderately True Mostly True Very True

23. The style of writing in this material conveyed the impression that its content was worth learning.

Not True Slightly True Moderately True Mostly True Very True

24. I learned some things that were surprising or unexpected.

Not True Slightly True Moderately True Mostly True Very True

25. After working on this material for awhile, I was confident that I would be able to pass a test on it.

Not True Slightly True Moderately True Mostly True Very True

26. The material was not relevant to my needs because I already knew most of it.

Not True Slightly True Moderately True Mostly True Very True

27. The feedback after completing the materials, made me feel rewarded for my efforts.

Not True Slightly True Moderately True Mostly True Very True

28. The variety of reading passages, activities, illustrations, etc., helped keep my attention on the materials.

Not True Slightly True Moderately True Mostly True Very True

29. The style of writing was boring.

Not True Slightly True Moderately True Mostly True Very True

30. I could relate the content of this material to things I have seen, done, or thought about in my own nursing practice.

Not True Slightly True Moderately True Mostly True Very True

31. There are so many words on each page that it is irritating.

Not True Slightly True Moderately True Mostly True Very True

32. It felt good to successfully complete this material.

Not True Slightly True Moderately True Mostly True Very True

33. The content of this material will be useful to me.

Not True Slightly True Moderately True Mostly True Very True

34. I could not really understand quite a bit of the content in this material.

Not True Slightly True Moderately True Mostly True Very True

35. The good organization of the content helped me be confident that I would learn this material.

Not True Slightly True Moderately True Mostly True Very True

36. It was a pleasure to work on such well-designed material.

Not True Slightly True Moderately True Mostly True Very True

APPENDIX H

Researchers Journal

Phase one first week

1. Met with educators for first meeting at hospital H
2. At first educator was leery about being too involved. Her supervisor appointed her to assist me.
3. After discussion with her I realized she did not get any information about the proposed research.
4. I also found out she was a novice as an educator.
5. I'm kind of worried about her inexperience.

6. It went well with hospital D educator who had been in role for quite some time.
7. She was very opened to the research process.
8. After my first meeting I was thinking at first hospital H would be the best place for the training since they hire more new nurses than hospital D.

9. Met with educator and director a Harper hospital to discuss research approach. (following week)
10. The Educator was asked by director to assist in project however educator did not have understanding of what was required.
11. I did not feel very welcomed that day by the educator.
12. I made another appointment with her to review the project.
13. My strategy was to perhaps to start with DRH first.
14. Meet with director and educator at DRH.
15. The director was very supportive and the educator had provided me with a crash cart to photograph.
16. I explained that I would need novice nurses in groups of five.
17. Director suggests that I will have participants for 1 hour during second day of orientation.
18. I took several pictures and arranged to meet with educator 2 weeks later

19. Met with the design team.
20. I feel really good about the team I have.
21. I start developing the material, consulting them for content and design.

22. I describe what I would like to design and my approach.
23. This group is very supportive. I trust their expertise.
24. met with design team instructional designer to develop power point and captivate.
25. I met with 2 educators and director at hospital D to review module and power point slides for accuracy and content.
26. Very receptive and supportive with feedback.
27. Educators reviewed content and layout. Changes were made per requests.

28. Met with for the third time educator from hospital H.
29. I was feeling frustrated because the educator did no really understand the role in which she would assist.
30. Once again I reviewed the research with her.
31. She seemed very rushed. I also touched based with the director of education who seemed just as rushed.
32. I did not feel like I was very welcomed but more of an inconvenience.
33. spoke with educator from hospital H and she and the director misunderstood the timeline of the research.
34. I sat down and outlined the timelines once again.
35. Initially hospital H was not going to get a group until 5 months later.
36. Feeling like I may never get this done
37. I'm starting to think this may be harder working with this hospital then I thought.
38. I got the sense the educator was uncomfortable since she was an inexperience educator she did not want to be too involved.
39. I shared with the educator the crash cart booklet.
40. Got some of her feedback.
41. Went home very frustrated.
42. Started to think I should go to hospital D for the first group.
43. I knew this would be a bigger risk in achieving my sample size since this hospital does not hire nurses as frequent as the other one.

44. Day 4 spoke with educator from the hospital D to arrange a possible date for training.
45. I met with her and the director of education to outline the timelines.

46. This meeting was more productive and I felt they showed more interest in the study.
47. I showed them the material developed during the meeting.
48. I left feeling they really liked what I was proposing.
49. I was contacted by the educator that we had our first group. We set a time and I was told it would be only four in this group.
50. I think this is really going to happen.

    Phase 2
51. Conducted by first training a hospital D.
52. I prepared all the materials and had thought how to sequence this so the participants could grasp what I was doing.
53. I went with the mindset that I would not be offended by any of the comments because my whole goal in the study was to improve the instruction.
54. I was a bit nervous. I felt like I was rushed. When soliciting the feedback I tried not to appear offended.
55. Too much information for one session
56. I knew I had to make some changes to this instruction and I wanted to do so much in such a small amount of time.
57. I had to resign myself to just focus on the crash cart.
58. I met with educator after the training and debriefed.
59. Consulted with the design team after I analyzed the information.
60. I made revisions and felt good knowing these members were really supportive of me.

    Phase 3
61. I had contacted hospital H in hopes to have some participants.
62. At first I was given permission to do training with the group of new nurses and then this suddenly changed.
63. I was told they will arrange for me to training a group of nurses that were part of their residency nurse program.
64. After speaking with director it was decided I would have access to a group of novice nurses on May 20th. Each time I contact the educator I do so with caution as an outsider.
65. I'm thinking perfect.
66. Well as time drew near for the training I had concerns over the crash cart condition.

67. I was very frustrated by the fact the educator nor did the director felt the cart need replacing.
68. Wow I thought I can't believe they don't care about how they may be perceived by the nurses using such an outdated cart.
69. I really tried to get a replacement without any success.
70. So I request if the director could provide a crash cart that was more updated with current meds and items. I was told I could straighten out the cart and that the cart had just been updated perhaps a couple of years ago.
71. I arranged to do the crash cart and was feeling mortified how the educators had been using a crash cart that was not adequate for training.
72. I just thought to myself make this day end and please make this training successful.

    Day 3
73. Met with design team member ER educator to review content of module and drug content.
74. Day 4 met with design team member nurse educator to review content.

    Day 6
75. Oh no I just got contacted by the hospital D to do another group of nurses.
76. I can't say no because they are relying on me to show up for each group of new nurses.
77. Ok I will do the training the next day after the hospital H.
78. I don't want to let this educator down.

    Day one of the training at hospital H.
79. I thought great I have to use an old cart and try to feel good about instruction that I developed.
80. I did not want to portray my feelings to the participant about my concern. All through the training I'm thinking how embarrassing.
81. At the end of the training session I kind of felt validated when the participants stated it would be nice to have a better cart.
82. I was told you have one hour exactly and I thought can't wait to be finished
83. The educator provided a space and crash cart to do the training.
84. The time was limited to 1 hour however I was able to get an extra 15 min. from the participants.
85. I felt very rushed.

86. There was not enough time to highlight some of the material prior to the class.
87. I had the participants fill out the demographics first.
88. Then I asked a couple of questions and quickly reviewed reading material and stated the format of the training.
89. I showed the participants a prototype version of a simulated crash cart focusing on the drug drawer.
90. Time constraint posed a problem. Once the hour was up I only had approx. 15 min to have them fill out survey and have a quick discussion regarding the training and what they had for suggestions.

    April 21 Provided training to nurses at hospital D.
91. Next training day. I feel much better because I'm teaching at hospital D where the crash cart is so much nicer and organized.
92. I felt in control of this training because of the support from the educators.
93. After the training I felt that I was making progress.
94. I made a point of always connecting with the educator for debriefing after the training.
95. Hmm I thought to myself, I don't feel very welcomed at hospital H so I will try to get all my participants from hospital D.
96. Phase 4
97. I was contact by the educator from hospital D.
98. She had group of 9 novice nurses. The last group of nurses.
99. Yeah I have the last group.
100. Oh boy this is going to be crowded. I'm not going to say anything to the educator.
101. I thought just do the best you can.
102. I really felt good do this final training.
103. I did not feel so good about not giving more time for them with the medication drawer.
104. The educator did tell the participants they would be able to practice latter for the medication part.
105. I'm so glad this part is over.
106. I felt I had accomplished what I had set out to do.
107. I provided the educator with the additional booklets and materials I developed for her own reference.

APPENDIX I

Communication and Letter of Support

hi Debra, yes Alta Gordon gave her permission, even though she didn't discuss with Dr. Taylor. Attached is the letter of support. Please let me know if I should add anything or if I should address the letter to a particular individual?

Robin M. Mazur, MSN, RN GNP-BC
Clinical Nurse Specialist, Acute Care
Detroit Receiving Hospital
Office: 313 745-4791
Pager: 313 745-0203 # 9950
Fax: 313 745-3637

To Whom it May Concern:

Debra Amaro, MSN, RN is seeking to perform her research study on the impact of using an anticipatory strategy for mastering the crash cart. Ms Amaro will work with small groups of novice nurses on a volunteer basis to develop a sound educational plan for teaching about the crash cart. Her work will benefit novice nurses and the DRH educators who may learn a new instructional technique. Ms Amaro has permission to conduct her research at DRH this fall, 2014.

Sincerely,

Robin M. Mazur, MSN, GNP-BC
Director, PCS Education
Detroit Receiving Hospital
Phone: 313 745-4791

Communication of support from DRH Educator

Hi Debra,

I will participate in your research project.

Beverly A. Baul RN, BSN
Patient Care Services Education
Detroit Receiving Hospital
313-745-3178
pager: 9861

APPENDIX J

Director Support

DMC
Harper University Hospital
Hutzel Women's Hospital

3990 John R Road
Detroit, MI 48201

To Whom it May Concern:

Debra Amaro, MSN, RN is seeking to perform her research study on the impact of using an anticipatory strategy for mastering the crash cart. Ms Amaro will work with small groups of novice nurses in our nurse residency program in collaboration with Betty Bear on a volunteer basis to develop a sound educational plan for teaching about the crash cart. Her work will benefit novice nurses and the Harper/Hutzel educators who may learn a new instructional technique. Ms Amaro has permission to conduct her research at Harper/Hutzel this fall and winter if needed, 2013/2014.

Sincerely,

Carol Frey, MSN, RN

Carol Ann Frey, MSN, RN
Director, PCS Education and Nursing Office Operations
Harper University and Hutzel Women's Hospital
Detroit Medical Center
3990 John R Road
Detroit, Michigan 48201
Phone: 313 745-9632

APPENDIX K

1. **Participant Interviews Pre and post training**

2. R-researcher
3. Participants: 1D(a,b,c,d) 2H(a,b,c,d,e) 3D(a,b,c,d,e) 4D (a,b,c,d,e,f,g,h,i)
4. **Group 1 (first training site D)** 1D(a,b,c,d)
5. **R- What is your biggest fear or concern in participating in a code blue?**
6. 1d-I am afraid of not knowing what to do
7. 1c-I am worried about the patient dying because of me.
8. 1b-I feel stupid not knowing what to do
9. 1d-I am afraid of not knowing what's in the cart.
10. **R- could you describe to me what the role of a nurse is in a code blue?**
11. 1a-not too sure
12. 1c-to do CPR
13. 1b-I have no idea
14. 1b-to help the doctor
15. 1d-to get things from the crash cart
16. **R- Is there one particular part of the crash cart you are more concerned with?**
17. 1c-As a new nurse I have no idea.
18. 1a-I don't know where anything is or what it's used for
19. 1c-I don't know what the medications are used for and how to give them
20. 1b-I don't know the process of the code blue. I have never seen the insides of the crash cart
21. 1d-not knowing how to use the equipment
22. **R-I would like to ask you what suggestions for this training if any would you make?**
23. 1a-With me I liked opening the drawers. I would like to review the medications more.
24. 1b-If we could practice putting things together, finding where things are; that is how I learn better.
25. 1c-I'm better at grabbing things out so I know where things are. We need more time to review the cart.
26. 1d- I was kinda of bored.
27. 1a-Allowed for more role playing, more hands on.
28. 1c-some more role playing
29. **R-What was the most useful part of today's training?**
30. 1a-Being able to look inside the cart and kind of knowing what you need for this and that and how to put
31. those things together.
32. 1c-I liked the hands on focus, how pieces are put together.
33. 1b- I did like that we eventually did hands on, but I would like to have more time to practice
34. 1d-I would like to go into the crash cart myself or as a group to find the things in the crash cart.
35. **R-Did powerpoint help you to recognize drugs?**
36. 1a-Yes, Knowing in my mind what drug to push.
37. 1a-All online is not good. For me it's like I'm looking at, but I don't remember and understand it until I do it.
38. 1c-Yeah
39. 1b-I think it is really important to learn what's in the cart and the process of the code to understand what happens ,
40. 1b-when everything gets assemble everyone gets called .

41.R-Did the module help you understand what your role was?
42.1c-Yes
43.R-Does it help you chunking the information so you get a mental picture of what the items are?
44.1c-Yes, cause if your just reading things ok, I have never seen that before.
45.1d-A little bit fuzzy.
46.R-What do you need to be more successful?
47.1d-The more hands on
48.1a-More practice
49.1c- Offer it later on. Some things like starting IV, we haven't practiced yet?
50.R-Were the pictures clear in the Module?
51.1a-I liked it
52.Group 2 (second training siteH) 2H(a,b,c,d,e)
53.r- What is your biggest fear or concern in participating in a code blue?
54.2a- I'm afraid of it all
55.2b- I am afraid of making mistakes
56.2c-I would rather just watch
57.2d- I don't want to look stupid
58.r- could you describe to me what the role of a nurse is in a code blue?
59.2a- not sure
60.2 b-To help the doctor, to do CPR
61.2c- give the medications
62.2e- I don't really know
63.r- Is there one particular part of the crash cart you are more concerned with?
64.2c-all of it
65.2b- not knowing all of what to do
66.2d- where to find items, not recognizing the item
67.2a- The medications
68.R-Based on the training today. If there is anything different in the crash cart training or suggestions you would like to make?
69.2a-More time. I liked being able to go into the crash cart and getting the items out. I think the booklet was helpful
70.2c-We did crash cart in orientation. There were too many people in the room
71.2d-I thought it was nicer to find things for actual procedures. I liked going into the crash cart.
72.2d-Grouping together things like the intubation.
73.2e-I liked opening the drawers and looking at where everything was because in orientation there was
74.like 15 of us looking at it.
75.2b-chunking was really useful. Updated crash cart would be nice. This is what it actually, how it is.
76.2e-I liked the training.
77.R-did the color coding drawers help?
78.2a-It helped a lot
79.2c-Yes, here it was useful
80.2e-it helped me to find items in the drawer
81.R-did the medication cards help you pull up the meds?
82.2e-for me it helped.
83.2a- I liked being able to retrieve things from the cart and the smaller groups.

84.Group 3 (site D) 3D(a,b,c,d,e)
85.r- What is your biggest fear or concern in participating in a code blue?
86.3a- feeling stupid
87.3b- I don't know where anything is
88.3c- I don't know the medications
89.3d- I'm afraid the patient might die
90.3e-I agree with everyone else it just scares me.
91.r- could you describe to me what the role of a nurse is in a code blue?
92.3b-help in the code
93.3d-Do CPR
94.3e-record the code
95.r- Is there one particular part of the crash cart you are more concerned with?
96.3a-the meds
97.3b-yeah the medications
98.3d-everything
99.R-what do you feel you need to be successful in crash cart training?
100.3a-I liked getting into the drawers, things that I wasn't familiar with.
101.3a-Probably could use a bigger room.
102.3c-I liked how you moved us along finding the stuff, for learning purpose I would like to go slower.
103.3e-the fact we were able to go to the cart and pick stuff out.
104.3b-The hands on aspect. Could you add sample of the code blue documentation sheet filled out?
105.3b-Taking out the meds out of the boxes.
106.3b- So we are not hysterical how do I use this.
107.3d- I don't want to have to read how to put something together.
108.3d- It would be nice to have a few hours of this, then a mock code at the end of it to see how things ran.
109.3a-I liked the handout, colored pictures of everything and what you need for each thing.
110.3a-Mock code would be idea at the end, then sometimes later use the cards again to look up again.
111.3c -I liked the way we learned to chunk the information, how to anticipate what was needed.
112.3b-possibly have us go into the cart and find things before the training just to see how much we improve.
113.3b-Try to find items without further knowledge.
114.3e-I liked going into the drawers and getting the things and putting them together.
115.R-what about the color coding of the drawers?
116.3a-I liked that
117.3d-is the cart comparable to cart that is on the floor?
118.R-Yes.
119.R-What suggestions do you have or changes you would like to see in this training?
120.3a-time crunch
121.3d-I would do a little bit more and more longer, let us figure out what is in the packages and the equipment.
122.3c-meds, I know it's a time crunch, it was really helpful
123.3d-I would like to do a mock code blue later on after the training.
124.3b-Maybe we could do a mock code
125.3a-I enjoyed it, the hands on
126.R-Did the cards help to pull out items?

127. 3a-I think that was a good part
128. 3c-maybe you could ask person to pull out items for central line to see if they could remember, if not you could give them constructive criticism
129. **R-did the color coding drawers help you**?
130. 3b-yes
131. 3b-Maybe because we spent time on airway, I remember what we needed more than anything else.
132. **Group 4 (site DRH)** 4D (a,b,c,d,e,f,g,h,i)
133. R-what is your biggest fear or concern in participating in a code blue?
134. 4a-I have no experience, all of it
135. 4b-that the person will die
136. 4c-I don't know where anything is. I am too afraid to get involved
137. 4d-When to initiate code process, when to call it
138. 4e-Knowing the medications
139. 4f-acting quickly, afraid I will make a mistake
140. 4g-communication is poor.
141. 4g-Mis-communication.
142. 4g-Wasting time and pt dying because of that.
143. 4h-knowing my role in a code
144. R-Which Role do you prefer in a code?
145. 4a- I have know idea
146. 4b-doing compressions
147. 4c-starting IVs, pushing meds
148. 4d-i would like to be told what to do
149. 4e-giving the meds
150. 4f-giving the meds.
151. 4g-the runner
152. 4h-getting the things needed in the cart
153. 4i-the medications
154. R-Is there one area of the crash cart that concerns you the most?
155. 4d-something not being there
156. 4a-medications
157. 4h- I want to know where everything is
158. Post training interview
159. R-is there anything suggestion to the training you would like to see differently?
160. 4a-We like it. No there's nothing I would change.
161. 4c-wish we had more time
162. 4b-I liked it
163. 4h-I thought it was good

APPENDIX L

NURSING RESEARCH APPLICATION FORM

Checklist:

- € DMC Nursing Research Council representative from the planned DMC study site is aware of your proposed study, indicate name _____.
- € Letter of approval from the proposed DMC study site, e.g. nurse manager, director, or VP was obtained. Include an electronic copy of the letter with your submission.
- € **Non-DMC employees:** Indicate in your application how data will be obtained.
- € **Non-DMC employees, students:** There is a DMC system contract and a DMC program site agreement on file with your school.

Instructions: Complete this application and submit with an electronic copy of your proposal, letters of support, and any appendices via email to Meg Campbell at m.campbell@wayne.edu. Meetings are currently held at 2:00 pm on the second Tuesday of each month. Notification of NRC review outcomes are communicated to the PI within one week of Council meeting.

Title of Study	A design-based research study examining the impact of using a motivational model for mastering the crash cart
Principal Investigator	Debra Amaro
Proposed DMC site	Detroit Receiving Hospital and Harper University Hostpital

Recruiting, Consent, and Potential Burden:

Are the participants patients or staff?	Staff
How will participants be recruited for your study?	Recruited by volunteer method with a small presentation or letter for newly hired employees.
Will staff assistance with recruitment be needed?	Yes _X___ No _____
If yes, Describe	They will help to identify novice/beginner nurses
How will DMC staff be oriented to your study?	I will provide a letter and a small presentation
Who will be responsible for obtaining informed	The researcher (Debra Amaro)

consent from study participants?	
Describe the potential research burden of your study on staff. Include such things as staff time, amount of effort during and after work hours, orientation time, subject recruitment, and meetings with the study team.	The participants will be asked to participate in a one hour training session. The staff will be asked to complete a couple of surveys evaluating the course content as well as the materials provided. There will be some informal surveys conducted via telephone and a small questionnaire for demographic information. There will be informal meetings with one or two educators at DRH to help inform the researcher of any design strategies or techniques they would like added to each revision during the process.
Describe the potential research burden for study participants:	The burden is minimal about one hour of their time to attend class outside of their work day.
What is the projected timetable for your study?	Approximately 12 weeks
What, if any, are the benefits to study participants?	Benefits for the novice nurse they will be receiving extra training regarding the crash cart. They will be actively involved in driving the process for designing training based on their participation and as the end users. The nurse educators will be receiving strategies and materials designed specifically for their organization.
What are potential contributions of your study to the practice environment?	This will provide another strategy for nurses to become comfortable and confident in utilizing the crash cart during code blue situation.
Describe special requirements (e.g., space for interviewing, equipment, access to records), if any, for the study:	The study requires the use of the training crash cart that is currently used in education. A small class room to conduct the training.

APPENDIX M

Demographic information

Instructions: Please circle your responses or fill in the required space.

1. How many months or years have you worked as an RN? _____

2. Please circle the level of nursing education you have:
   Diploma, Associates, BScN, or MScN

3. What is your employment status?
   Full time, part time or other

4. Have ever participated in a code blue?
   Yes or No

5. If yes how many times in the past year? _____

6. When was the last time you reviewed the contents of a crash cart? _____

7. How confident are you in participating in a code blue? [1 Very confident, 5 Not confident]

   1 2 3 4 5

APPENDIX N

Crash Cart Training Pre and Post Interview Questions

1. What is your biggest fear or concern with the crash cart?
2. Can you describe to me the role of a nurse in code blue.
3. Is there one particular part of the crash cart you are more concerned with?
4. Can you tell me what was most useful in the training?
5. What would be one change you would make to the instruction?
6. Other suggestions that would be helpful in this training?

APPENDIX O

Researcher Journal Format

1. Describe the event or situation in detail with each encounter.

2. Reflect on your feelings, and analyze what areas need improvement. How did you feel about the situation? Did things go as planned? Were there any barriers or challenges?

3. Evaluate what worked and what didn't.

4. What are the next steps that will drive your research?

APPENDIX P

Post Survey Questions

1. Did the training increase your confidence in identifying and accessing the items in the crash cart?

   Strongly Agree Agree Neutral Disagree Strongly Disagree

2. Do you feel prepared to participate in a code blue as a result of the training?

   Strongly Agree Agree Neutral Disagree Strongly Disagree

3. Did this training process help you identify the items in the cart needed in a code blue?

   Strongly Agree Agree Neutral Disagree Strongly Disagree

4. Are the labels on the crash cart drawers helpful in locating the items?

   Strongly Agree Agree Neutral Disagree Strongly Disagree

5. Learning the crash cart contents will improve my performance during a code blue.

   Strongly Agree Agree Neutral Disagree Strongly Disagree

APPENDIX Q

Looking for Registered Nurses To Participate In Crash Cart Research

I would like to introduce myself, Debra Amaro, a registered nurse that has been approved by the WSU IRB as well as from the DMC research council and DMC nursing research committee to conduct my research study: A Designed-based Research Study Examining the Impact of Using a Motivational Model for Mastering the Crash Cart at your hospital.

If you are interested in making a difference in nursing practice, unlocking the mystery of what is in the crash cart, you can be a part of this innovative study. I would like to invite you to participate in a Crash Cart training research study if you are a registered nurse with less than one year nursing experience or a recent graduate. This is an opportunity to be part of a designed-based research study that will examine motivational strategies for mastering the crash cart. As a participant you will receive additional crash cart training and will be actively involved in the design and development for this training. Participation in this study is strictly voluntary and requires you to attend a 1 hour training session, including completing a survey and an interview. This study provides a unique opportunity for nurses to have a voice in the design and development of this training. All data from this project are confidential and will be used for research purposes only.

If you are interested in being a part of this study please contact me by e-mail and I will provide you with an informed consent form outlining the project. As an incentive for participating in this study you will be entered into a raffle drawing for a gift certificate valued at $100.00 at a uniform store.

Thank you in advance

Debra Amaro RN, PhD candidate

APPENDIX R

Crash Cart

Crash Course

Created by D.Amaro

Objectives

1. **At the end of this manual the learner will be able to state their role in a code blue.**
2. **The learner will be able to recognize equipment required in a code blue.**
3. **The learner will be able to identify specific items used for code blue situations.**
4. **Will become more familiar with the crash cart contents.**

GUIDELINES FOR FUNCTIONING IN A CODE BLUE

Know when to call a code. Recognize an arrest.

- Establish unresponsiveness.
- Call out from the room Code Blue
- Dial 114 (DRH) or 117 (Harper)
- State unit room number and bed

Start BLS Sequence: **Circulation, Airway, Breathing (CAB)**

▼

Quickly assess pt responsiveness, breathing.
Check the carotid pulse or look for signs of circulation
Start Compressions, if indicated, using current AHA guidelines

▼

After 30 compressions, begin respirations if Ambu bag available
Continue compressions alone until Ambu bag arrives

▼

Place the AED next to the victim and power on.
Attach electrode pads in the proper position (pictured on the pads).
Clear the victim and press the ANALYZE button.
IF SHOCK advised, clear the victim and press the SHOCK button.
Stop when AED gives "no shock indicated" message.

▼

Resume CPR immediately. Start with compressions.
If breathing and signs of circulation are present,
monitor victim until advanced life support rescuers arrive.
Recheck for Pulse and Breathing only every 5 cycles/2 minutes.

IMMEDIATE RESPONSE TO THESE ASSESSMENT FINDINGS IS TOP PRIORITY.

ALL Unit Staff will respond to Code:

- Crash Cart to the Room with suction machine.
- Lower height of bed to comfortable working position with HOB flat.
- Place **BACK BOARD** under patient's back between shoulders and waist.
- Remove Head Board from bed accommodate respiratory efforts.
- Retrieve P**atient's chart** and bring the **WOW** to the room.
- Retrieve Dynamapp, if requested a Doppler and Pulse Oximeter.
- Retrieve glucometer.
- Remove roommate, if possible. If not delegate someone to remain with patient.

Upon arrival of Crash Cart.

CPR SHOULD NOT BE INTERRUPTED

A. Make sure AED (automated external defibrillator) monitor faces the bed so that the code team can observe it.

B. MRX defibrillator has battery life 4-6 hours.

C. Connect patient to MRX via the AED and pads. ECG leads can be connected later.

D. Connect O2 flow-meter into (green) wall outlet. Attach O_2 delivery tubing to meter. If patient is being bagged with an Ambu-bag or is intubated set flow meter to 15 liters per minute (all the way!). When using the Ambu-bag, be sure to fully expand reservoir tubing.

E. Backboard or (Head Board can be Removed from the bed and be used as a substitute).

F. Attach Pulse Oximeter and Dynamapp.

G. Retrieve CPR record on clipboard attached to crashcart.

H. Have glucometer at bedside.

I. Remove Dentures and place in denture cup.

J. Deflate air mattress.

K. Select oxygen flow meter with green (Christmas tree top) Yellow meter is for air.

The 4 critical tasks of resuscitation:

1. **Chest compressions** – Any healthcare provider or BLS trained individual can do this. Typically nursing **(RN & PCA)** will begin the CPR, and then it will be rotated between nursing and the medical students/interns/respiratory therapists.

2. **Airway management** – initially nursing will begin bagging and/or insert an oral airway as needed, then respiratory therapy will assume the responsibility

3. **Monitoring and defibrillation** – a designated RN needs to assume this responsibility

4. **IV access and medication administration** – The nurse will make there is a patent IV by checking for a blood return. The doctors may insert a central line if indicated. A designated RN needs to assume responsibility to administer medications as ordered by the Code Team Leader. **Prepare a 1 Liter 0.9NS bag with macro drip tubing. Used for fluid bolus, pushing and flushing medications.**

The following personnel respond to a Code Blue: All persons trained in CPR are responsible to initiate CPR

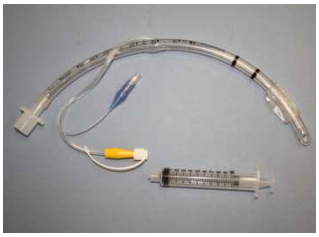
Roles	Responsibilities
Medical team: Medical resident on call Medical resident/interns on call Medical students	Team Leader Run the Code, administer shock for defibrillation Perform CPR-chest compressions Central Line Insertion Blood Gas Intubation
Anesthesia//nurse anesthetist	Intubates patient CO_2 detector
Pulmonary Care Services-Respiratory therapist	Ventilates patient, Blood Gas
Pharmacist	Assists in preparing of drugs on the day and/or afternoon shift
Administrative Nursing Supervisor/Clinical Manager/charge person	Traffic Control Staffing, supplies, facilitates equipment Participates in Nursing Role prn Designate nursing staff to cover patient assignment
Primary Nurse:	Communicates key information to the code team Stay with the patient until patient is stabilized Records CPR report form-drugs, times, all documentation WOW at bedside Apply MRX with AED pads
Additional nurses: Cart nurse Medication nurse Rapid response nurse or SWAT team	Manage Crash Cart Drug Box Dynamapp/Doppler Monitors strips, Blood Gas, Pulse OX Cover patient assignments Delegation Glucometer
Rapid response Nurse	Monitors strips, medications
Pastoral Care	Spiritual support if requested
PCAs	Runner for equipment, stat labs, supplies Remove second patient from the room or stay with patient to provide support
Unit Clerk	Relay information per telephone, pager, paper work Orders another crash cart right away through the EMR Runner for equipment, stat labs, supplies

Anticipate and Act

Intubation:

- Ensure wall suction regulator is in place with canister and tubing. Move portable suction machine if wall suction if not available. Turn on and connect suction catheter or Yankauer to tubing.
- If intubation is required, have suction equipment, laryngoscope, endotracheal tube and other intubation equipment ready. Have 02 setup and Pulse oximeter available.
- Provide sterile gloves, sterile field drape, trach ties and lubricant for procedure.

Laryngoscope & Straight



Endotracheal tube with syringe

Suction equipment w/Yankauer

Curved blade

Co2 detector

Yankeaur

Trach ties

Entubated patient with Ambu bag and

Stylet

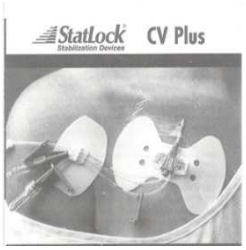
Central Line Insertion

- Everything needed for central line is found in the central line kit on the crash cart. Everyone near the pt. needs to wear masks during the procedure. The RN and doctor fill out the central line time out form. Additional drapes, sterile gloves are on the cart. Have IV setup 0.9 NS.

Central line

Bio Patch


Mask with



Stat Lock

Defibrillation

1. Turn MRX device on first. Defib pads are applied with Q CPR sensor (PUCK) placed over the lower sternum with the sticky pad on the skin. The AED will direct you to charge, clear and defibrillate if required.
2. When doctor or ACLS personnel arrive, activate manual mode by turning the green dial.
3. You do not have to remove AED pads to deliver a shock. However if the doctor uses the paddles then the cable must be changed to utilize this feature (See equipment manual). Physician will place defibrillator paddles flat onto gel pads and discharge voltage after yelling and visually seeing that everyone is **"ALL CLEAR**".


AED pads with

QCPR sensor is

1. Select energy
2. Charge
MRX in AED mode


MRX in manual mode

Blood Gas

- Blood gas kit has heparinized syringe and antiseptic for doing procedure. Expel excess air from sample. Once specimen is obtained, label specimen bag and syringe. Place specimen in bag of ice and transport to RESPIRATORY LAB stat.

Blood gas

Heparinized syringe

Expel excess air

Specimen bag

Oral airway

- Ambu Bag and valve mask attach to O_2 tubing and attach to O_2 flow meter set at 15 L./min. Suction canister with Yankeaur attached to suction machine. Obtain correct size oral airway and a tongue blade to assist in insertion.

Ambu-bag with face-mask

Oral airway

Suction canister with tubing

Nasogastric tube

- Ng insertion requires NG tube, suction tubing, lubricant, irrigation, and 60 cc Toomey syringe with tip. Stethoscope to determine placement. Have suction equipment ready.

Toomey syringe

Suction tube NG tube

Points to remember

A. ***CPR SHOULD NOT BE INTERRUPTED FOR MORE THAN 5 SECONDS FOR ASSESSMENT OF SPONTANEOUS BREATHING AND PULSE.*** Interruptions for intubation, defibrillation, or moving the patient should not exceed 10 seconds. Cardiac output during CPR is low, averaging only 1/4 to 1/3 of normal.

B. When CPR is interrupted it results in a severe fall in tissue oxygen delivery because there is no cardiac output during Asystole/ Pulseless Ventricular Tachycardia/Ventricular Fibrillation.

C. Utilize unit Pyxis for drugs requested and not in cart.

Post CPR Responsibilities

A. Complete CPR Report Form. Ensure physician completes section designated. Place white copy in patient's chart. Yellow copy should be forwarded to pharmacy and copies of posted rhythm strips.

B. Code Summary should be run before the patient is disconnected from MRX and/or the machine is shut off. These strips must be placed on the CPR Record.

C. Call Materials Management to retrieve the used crash cart. Complete audit form attached to cart to record omissions and equipment malfunctions. Medication tray should be locked with red tags provided. Return locked medication box to the crash cart.

D. Verify that physician has notified patient's family/emergency contact and attending physician of patient's condition.

E. If patient is moved to Critical Care call report to the appropriate unit and make sure that all belongings and IV medications are transferred with the patient. Belongings may be given to the family. If the patient has expired, the Body Disposition Form must be completely, filled out and delivered to security. The nursing supervisor is to be notified of all expirations.

F. Fill out yellow Internal Transfer Summary Sheet, and send all patient records to the receiving unit including the Code Sheet and all rhythm strips obtained during the code).

Frequently used CODE Drugs

DRUG	USE	DOSE(IVP), FREQUENCY,COMMENTS
1. Epinephrine	**Any** pulseless pt. Stimulates heart activity	1 mg. 10ml of 1:10,000 solution Bristol jet syringe Every 3-5 min.
2. Atropine	Asystole, Bradycardia Slow rate PEA	**1mg** for Asystole 0.5mg for Bradycardia Every 3-5 min. **Max** total 3 mg
3. Amiodarone	V Fib, Pulseless V Tach	300mg Mix **2** Vials (150mg) in 20 ml of D5W. Will foam up.
4. Magnesium Sulfate	Torsades, V Tach	**2gm** IVP 1 gm vial—Draw up **2**
5. Narcan (Naloxone Hydrochloride)	Narcotic Overdose, no respirations	2 mg
6. Dextrose 50%	Hypoglycemia	25 gm
7. Sodium Bicarbonate	Acidosis	50mEq
8. Calcium Chloride **9.** D50 + Insulin	Hyperkalemia	Calcium Chloride 10%,1 **gm** D50=25gm Insulin = 10 units **IVP**
10. Vasopressin	Pulseless arrest	40 **units** (2 vials, 20units ea) one time only
11. Lidocaine	V Tach V Fib	1-1.5mg/kg
After the Code		
12. Dopamine	Hypotension, Bradycardia	Mix 400mg-800mg (1-2 vials) In 250ml bag D5W, Run as drip 0.5-20 **mcg**/kg/min
13. Levophed (Norepinephrine)	Hypotension	Mix 16mg(4 ampules, 4mg ea) in 250 ml D5W 0.01-1.0 **mcg**/kg/min

DMC
DETROIT MEDICAL CENTER

☐ CHM ☐ HWH
☐ DRH ☐ KEI
☐ DSH ☐ RIM
☐ HUH ☐ SGH
☐ HVSH ☐ _____

Patient Label

CARDIOPULMONARY RESUSCITATION REPORT FORM - ADULT

TIME	RHYTHM (Code)	BP	HR	PULSE (+) (-)	SHOCK Joules (D)Defib. (S)Synch.	CPR ☑	Respiratory Support code	INTERVENTIONS	
								Medications (dose / route / rate)	Labs / Results Rhythm / Effect
						☐			
						☐			
						☐			
						☐			
						☐			
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						☐			
						☐			

Resuscitation Efforts Completed: Time: _____ Event Recorder: _____ _____
Signature / Title Date / Time

Respiratory Support Codes	Rhythm Codes			
MRB: Manual Resuscitation Bag with oxygen	**SVT:** Supraventricular Tachycarcia	**VF:** Ventricular Fibrillation	**VT:** Ventricular Tachycardia	**AG:** Agonal
V: Ventilator	**SR:** Sinus Rhythm	**SB:** Sinus Bradycardia	**ST:** Sinus Tachycardia	**P:** Paced
SO: Supplemental oxygen (Record dose / device)	**HB:** Heart Block (designate 1, 2, 3)	**AF:** Atrial Fibrillation	**PEA:** Pulseless Electrical Activity	**AS:** Asystole

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ABSTRACT

A DESIGN-BASED RESEARCH STUDY EXAMINING THE IMPACT OF USING A MOTIVATIONAL MODEL FOR MASTERING THE CRASH CART

by

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This design-based research study examined the effects of crash cart training using Keller's motivational design model ARCS (Keller, 2010) for novice nurses. The purpose of this mixed-methods design-based research study was to determine the motivational levels of novice to beginner nurses in the work environment and seek out whether or not motivational designed instruction for the crash cart would significantly impact their mastery of the crash cart. Quantitative and qualitative data were collected within iterations of the study to determine the motivational levels of novice nurses pertaining to crash cart training. Motivational levels were determined utilizing Keller's (2010), "Course Interest Survey" and the "Instructional Materials Motivation Survey".

The literature review incorporated learning, motivational, and instructional design theories consisting of a comprehensive review from a historical view to current trends in design and research. Included in the literature review were the ARCS motivational design model, Layers of Negotiation model and crash cart training. The overall review was to examine what was known in the field of instructional design and to determine what the current methods of training nurses with the crash cart.

The convenience sample for this study was novice to beginner nurses from two participating hospitals, that are part of a large medical center in southeastern Michigan, located in the Detroit Metropolitan area. There were five groups of novice nurses that were derived from the 28 participants that received training throughout the research study.

Findings from the study revealed that motivational levels of nurses had increased with motivationally designed training using Keller's ARCS model and strategies. The data was presented using descriptive statistics to report the findings of the study. The iterative nature of design-based research along with social negotiations using the Layers of Negotiation model proved to be an effective way to design motivational instruction.

This was a designed-based, mixed methods research study that perhaps was the first that actually addressed the motivational levels of nurses with iterations while designing the training for crash carts. Many studies reported that nurses remained fearful and lacked confidence in spite of the mock code blue training methodology that typically is used for learning the crash cart.

This design-based research study proved that utilizing the iterative process using motivational design strategies along with social negotiations yielded positive results in this study. Additionally, the findings of the study suggest nursing educators to examine closely the motivational levels of nurses so they to can design the most effective training for them.

AUTOBIOGRAPHICAL STATMENT

Debra Amaro is a Registered Nurse with several years of experience in Maternal-Child, Community Nursing and in Instructional Design. Debra Amaro is a member of the Six Nations of the Grand River Reserve. Debra Amaro is a graduate from Wayne State University with a Doctorate in Instructional Technology. Debra Amaro has a Masters in Community Nursing and received a Masters as an Education Specialist from Wayne State University. Debra Amaro received her Bachelors of Science in Nursing from the University of Windsor. Debra Amaro's passion is working with the marginalized populations and is a strong advocate for those who are in need. Debra Amaro is a child advocate known as a CASA volunteer in her community.

Currently Debra Amaro works as a student advocate for nursing students in a community college in Michigan. Debra Amaro was a lecturer at a local university in the Nursing program. Other teaching experiences involved working in a acute care hospital as a nurse educator. Mentoring students in a supportive and nurturing environment while providing them the skills needed to become successful nurses is the primary focus of Debra Amaro's philosophy.